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THE MAGNETIC SURVEY OF THE OCEANS.*

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I SHALL not undertake to give you a set paper this afternoon, but shall show you a number of slides illustrating especially the magnetic work accomplished at sea in connection with the magnetic survey of the globe. That will doubtless be the most satisfactory way of giving you, in the limited time at our disposal, a general idea of the work, and the slides, moreover, will very largely speak for themselves.

The first expedition for the purpose chiefly of making magnetic observations was sent out by England between the years 1698 and 1700. It was placed under the command of Edmund Halley, who, during those two years, 1698–1700, made determinations of the magnetic declination over the North and South Atlantic ocean. He was exceedingly zealous in this work, observing a declination almost daily, and making use of every opportunity to get observations. It is rather noteworthy that although many expeditions have been carried on since by England and other countries, it did not happen till a few years ago that a ship was again sent out solely for the purpose of making magnetic observations.

You will probably recall that the vessel under Halley's command was the *Paramour Pink*. It is a rather remarkable fact that although Halley was a prominent member of the Royal Society he made no formal communication upon the results of his voyage, nor upon the chart which he prepared, giving the lines of equal magnetic variation (declination) for the North and South Atlantic as based upon his observations. He later published a "world chart" on which these lines were extended, with the aid of the observations of others, so as to cover the Indian Ocean and the China Sea.

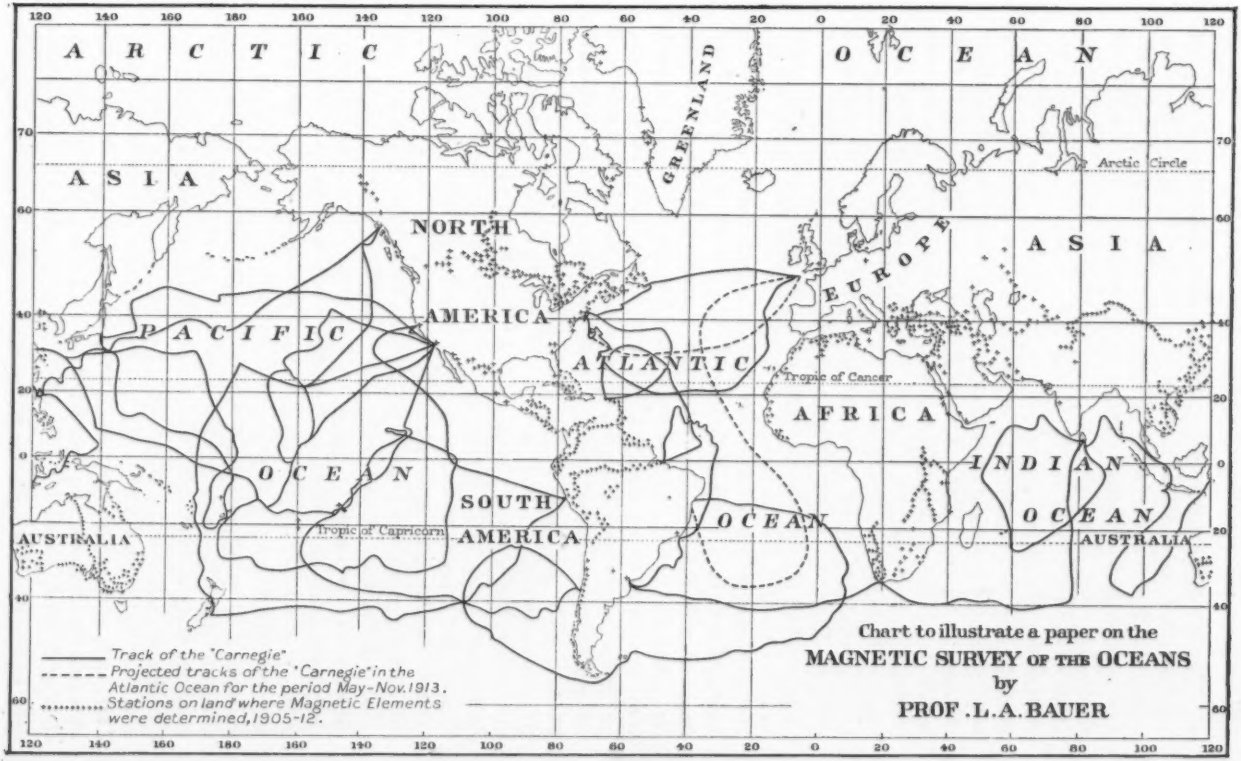
* Royal Geographical Society, June 4, 1913.

The only references to Halley's charts I have been able to find are in the minutes of the Royal Society. Halley only referred in print to his chart when he had occasion some years later to defend its accuracy. In 1869 Airy could not find any one who had ever seen the Halley chart, so he made a search and found a copy in the British Museum and reproduced it in the Greenwich observations of 1869; he thought it was the original Halley chart, and gave the date 1701. However, in 1895, I made a systematic examination of the charts at Paris, Hamburg, and the British Museum, and it was my good fortune to find the particular chart, now projected on the screen, which I believe to be a copy of the original Halley chart. It will be noted that it covers only that portion of the globe which Halley himself traversed, and it is interesting also that this map gives the tracks of the second cruise of the *Paramour Pink*, 1699–1700. What fixes the date of this chart is the dedication to King William III., who fitted out Halley's expedition. As William III. died March 8, 1702, it must have been published before that event—probably in 1701. The "world chart," reproduced by Airy, and more recently also by Hellmann in No. 4 of his valuable series of reprints, was dedicated to "Prince George of Denmark, Lord High Admirall of England, Generalissimo of all Her Majesty's Forces," but Prince George did not bear this title until April 17, 1702, hence the "world chart" could not have been published in 1701, as Airy thought, but probably in the latter part of 1702.*

Halley's memorable magnetic expedition is of added interest just now because of the general magnetic survey of the oceans at present in progress. And, while we have Halley's chart before us, I may point out that when we crossed the Atlantic, in October, 1909, from St. John's, Newfoundland, to Falmouth, with the non-magnetic yacht, *Carnegie*, practically the same route was covered as by Halley's ship over 200 years before. Since then this vessel has repeatedly crossed Halley's tracks in the Atlantic.

We are thus led naturally to a brief consideration of the modern work. It was my privilege to submit in 1902 to the Trustees of the Carnegie Institution of Washington a project which had received the endorsement of leading investigators, and which had, as its chief aim, a general magnetic survey of the globe, to be completed within a period of ten to fifteen years, so as to eliminate as far as possible the effect of the secular variation. In December, 1903, the Trustees took the necessary steps for carrying out this project, and, accordingly, founded the Department of Research in Terrestrial Magnetism, with authority to begin work on April 1, 1904. The first year was largely spent in the necessary preparatory work and

* Those interested in the history of the Halley chart may be referred to the speaker's articles in the journal *Terrestrial Magnetism*, January, 1896, and September, 1913. Halley's journal and observations were finally published in Alexander Dalrymple's 'Collection of Voyages, chiefly in the Southern Atlantic Ocean.' London: 1775. See also the revised compilation of Halley's results by J. P. Ault and W. F. Wallis, in *Terrestrial Magnetism*, September, 1913.


ARCTIC OCEAN
GREENLAND
ASIA
NORTH AMERICA
EUROPE
ASIA
Arctic Circle
PACIFIC OCEAN
ATLANTIC OCEAN
Tropic of Cancer
AFRICA
INDIAN OCEAN
SOUTH AMERICA
Tropic of Capricorn
AUSTRALIA
AUSTRALIA
Track of the "Carnegie"
Projected tracks of the "Carnegie" in the Atlantic Ocean for the period May-Nov. 1913.
Stations on land where Magnetic Elements were determined, 1905-12.
Chart to illustrate a paper on the
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by
PROF. L. A. BAUER

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with familiarizing ourselves with all that had been done previously. It became immediately evident that active operations should first be begun in the Pacific Ocean, for in this region comparatively few magnetic data had been obtained. Accordingly, in July, 1905, a magnetic survey of the Pacific Ocean was begun on the chartered sailing vessel, the *Galilee*, of about 600 tons. She was modified as far as was possible without reconstructing the vessel, the principal changes being the substitution of hemp for the steel rigging and the building of a bridge running fore and aft between her masts (see Fig. 1), and situated about fifteen feet above the deck; the instruments were mounted on this bridge, and were thus as far away as practicable from the remaining iron entering into the construction of the vessel. As the result of these changes, it was found that this vessel had the smallest deviation coefficients of any previously engaged in making magnetic observations at sea. With her the work was carried on in the Pacific Ocean for three years, 1905–1908; the aggregate length of the cruises, which extended north as far as Sitka, Alaska, and south to Port Lyttelton, New Zealand, was 60,000 miles.

The principle followed from the very beginning of our magnetic work was to observe each magnetic element—declination, dip, and intensity—in duplicate, with different instruments and observers and under as varied conditions as possible. In arranging the instruments on the special observing bridge of the *Galilee*, they had to be spaced far enough apart to eliminate any effects from the instruments themselves, and, as it was an open bridge, the observers and instruments were exposed to wind and weather. The gentleman on the right (see Fig. 4) is Mr. W. J. Peters, who took command of the *Galilee* in 1906, and who is now in command of the *Carnegie*, the vessel used at present. Captain Peters may also be known to you as having been second in command of the second Ziegler Polar expedition, and in charge of its scientific work. The success of the ocean work thus far accomplished is in very great measure due to him and to the zeal and skill shown by the observers.

In spite of the fact that the *Galilee* had the smallest deviation coefficients of any vessel, the effects were still large enough to make necessary their being taken into account. The determination of these corrections required an undue amount of time, and the observations could not be completely computed until the completion of a cruise. I accordingly recommended to the Trustees of the Carnegie Institution that it would be more economical to build an especially adapted vessel, in the construction of which all materials affecting the compass should be eliminated as far as possible. This recommendation was adopted, and thus the *Carnegie* came into existence in 1909; she was launched in June, 1909, and entered on her maiden voyage in August, 1909. The next slide (see Fig. 2) shows this vessel leaving St. John's, Newfoundland, on October 2, 1909, bound for Falmouth. Westerly gales were an almost daily occurrence on this maiden trip of the *Carnegie*, but with winds and

FIG. 1.—THE CHARTERED VESSEL *GALILEE*, WITH WHICH THE CRUISES IN THE PACIFIC OCEAN 1905–08 WERE MADE (THE SPECIAL OBSERVING BRIDGE WILL BE SEEN RUNNING FORE AND AFT BETWEEN THE MASTS).

FIG. 3.—VIEW OF THE DECK OF THE *CARNEGIE*, SHOWING THE DOMES OF THE TWO SPECIAL OBSERVING HOUSES AND THE STANDARD COMPASS MOUNTED ON THE BRIDGE BETWEEN THE DOMES.

FIG. 2.—THE *CARNEGIE* STARTING OUT ON HER MAIDEN CRUISE IN 1909.

FIG. 4.—CAPTAIN PETERS (ON THE RIGHT) AND MR. AULT OBSERVING THE MAGNETIC DECLINATION WITH THE STANDARD COMPASS (THE MARINE COLLIMATING COMPASS).

FIG. 5.—THE SCIENTIFIC PERSONNEL AND THE CREW OF THE *CARNEGIE* WHILE AT FALMOUTH, OCTOBER, 1909.

waves with us the trip of 1900 knots was accomplished in 11⅔ days, averaging 161 knots a day, and even running at times, under sail alone, up to 210 knots. The sea was generally rough, and, in spite of our rolling sometimes through an angle of 40 degrees, magnetic observations were taken daily. We thus had opportunity at the very start to test vessel, instruments, and methods, and we found that, even under the adverse conditions encountered, results worth while could be obtained.

The *Carnegie* is 155½ feet in length over all, 128½ feet on the load-water line, 33 feet beam, draught 13½ feet, displacement about 600 tons, and is built almost entirely of wood fastened together with locust-tree nails, copper and Tobin bronze bolts, and composition spikes. She is practically a sailing vessel, brigantine-rigged; she has, however, a small amount of auxiliary power, a producer-gas engine, which, with the exception of the pistons and cams, is wholly built of brass and copper. The small amount of steel, 600 out of 20,000 pounds of metal entering into the construction of the engine, is so far removed from the observing instruments as not to have an effect. The anchors, of which there are four, of aggregate weight 5500 pounds, are bronze. The rigging is of hemp, the metal parts being all of bronze or copper. As we could not use iron chains for the anchors, and as a bronze chain of the required strength was too expensive, 11-inch hemp cables were adopted; this made it necessary to use the old fisherman windlass.

On the *Carnegie*, as will be seen from the slide (Fig. 3), the instruments are under shelter. The glass dome of the observatory shown in the foreground (Figs. 3 and 5) can be revolved just like the dome of an astronomical observatory, two of the glass panels being removable, so that both astronomical and magnetic observations can be made with complete protection from wind and weather. Having a vessel in which the deviation corrections, if any, are on the order of or less than the error of observation, as has been proved by elaborate tests made at various ports, it is now possible to compute the observations on board and know the results within an hour after they are made. On arrival at port, the results are promptly transmitted to the Office at Washington, whence they are supplied to the leading hydrographic establishments—to the British Admiralty, the German Seewarte, the U.S. Hydrographic Office, etc. The data of interest to mariners are also being promptly published in each issue of the quarterly journal *Terrestrial Magnetism and Atmospheric Electricity*. Thus the magnetic declinations observed on the *Carnegie* up to arrival at Bahia, Brazil, on April 24 of this year, are already in print.

The exclusion of possible disturbing effects on the instruments has been carried out quite rigidly. The construction of the observatories (Fig. 3) is such that it is not possible for a sailor, for example, to bring anything nearer to the mounts of the instruments than eight to ten feet, and the observers are required to state on the observation-forms whether they have removed from their persons all iron or steel articles. The entire

personnel is composed of twenty-one men, five usually in the scientific party, and sixteen in the crew, including the watch officers. The *Carnegie* is now working in the South Atlantic ocean, having left Bahia, Brazil, on May 18; after touching a second time at St. Helena, she will proceed to Falmouth, being due there early in September. Thence she is to return to New York at the end of this year, and will then have completed a circumnavigation cruise begun in June, 1910, aggregating 70,000 miles in length. [The *Carnegie* arrived at Falmouth, September 12, 1913.]

The following slide shows four views taken aboard the *Carnegie* on the cruise from Colombo, Ceylon, to Mauritius in July—August, 1911. We were almost six weeks at sea and observed daily. The view on the left shows the two observers making declination observations with our standard instrument called the marine collimating compass, devised by ourselves, and constructed in our workshop. In the after observatory, declination observations are also being made with a second instrument of different construction from the first. Fig. 3 shows you the two observing houses with the marine collimating compass (Fig. 4) mounted on the bridge. With the latter instrument, it is possible to get a declination observation within a few minutes, which is worth while having. The outstanding problem with regard to sea work is to obtain a sufficient number of declination observations. Dip and intensity observations can be made daily, almost regardless of the sea and weather, but for declination observations the sun or the stars must be visible. On land, when a cloudy day is encountered, the magnetic meridian is referred to some fixed mark, the azimuth of which is determined later by astronomical observation when opportunity affords. With the usual form of azimuth devices used at sea, the sun must be projected down on the oscillating compass card, and it may require fifteen minutes to half an hour before the motions of the card are sufficiently eliminated, and a satisfactory result is obtained. In this instrument, fundamentally a liquid compass, the principle of the land magnetometer has been practically carried out; scale readings are taken just as with a land magnetometer, and are later reduced to the magnetic meridian. Thus, even if the sun or the stars be visible but a few minutes a useful declination result may be obtained. There are other new features of this instrument as, for example, the overcoming of the drag of the card during motions of the ship.

The next slide shows the Lloyd-Creak dip circle mounted on the gimbal stand. Except for some modifications, it is essentially the same instrument as that devised by Captain Creak and used on the Antarctic expeditions since 1902. We have introduced an arrangement with which the deflection observations can readily be made at two distances, instead of one as in the original instrument, thus making the L.-C. instrument now available for force observations in all regions to be traversed. The chief difficulty encountered in accurate work with this instrument is the

uncertainty of the correction of the dip needles to standard when the observations cover a large range of magnetic latitude. This trouble is inherent, of course, in land dip circles as well; but, owing to the form of mounting of the needle which must be adopted at sea—the pivots working in jewels instead of rolling on agate planes, as in the land instruments—it makes itself specially felt in sea work. In order to overcome the friction of the needle in the jewels as much as possible, the needle is kept in constant vibration, but in spite of all care and every precaution, owing to the wear of pivots and of jewels, corrections enter which are difficult to control. To obtain some check, therefore, there was installed on the *Carnegie*, when at Tahiti last September, a marine earth inductor mounted on an improved gimbal stand; both instrument and stand were devised and constructed in the workshop of the Department. A point that has not been taken sufficiently into account by previous expeditions is that of the level of the dip circle on the gimbal stand; the whole error of level may enter into the value of the dip, and may at times amount to as much as one degree. In our form of gimbal stand the inner ring is reversible, so as to permit observations to be made for two mountings differing by 180°. The preliminary results at hand indicate that, with the controls we now have, a dip result can be obtained at sea within an absolute accuracy of one-tenth of a degree, and we are hoping ultimately to reach one-twentieth of a degree.

The following slide exhibits the instrument we have called the "deflector," devised and constructed by ourselves, for observing the horizontal force direct, as also the magnetic declination (see Fig. 5). I ought to say that from the observations made with the L.-C. dip circle, the horizontal force is derived by computation from the dip and total force. In the deflector now in use on the *Carnegie*, the observations may be made at various deflecting distances both above and below the card and with two different magnets. The constants for this instrument, as well as for all the other instruments used at sea, are controlled at every port visited, where elaborate comparisons are made between the ship and land magnetic instruments. The same observers who make the magnetic and electric observations also take part in the necessary astronomical observations for the navigation of the vessel and the determination of geographical position.

We have next on the screen a portable theodolite-magnetometer; here the theodolite or magnetometer may be mounted on the same base. This instrument was also devised and constructed in the workshop of the Department and is intended primarily for use on difficult land expeditions, such, for example, as canoeing trips, where the matter of weight of outfit is an important consideration. With this one instrument can be made all required astronomical observations (latitude, longitude, azimuth) and magnetic observations (declination, dip, horizontal and total force). For regions where the dip is large, the horizontal force is weak, hence it is better to observe the total force.

The slide now before you (Map, p. 519) will give you some idea of the field work already accomplished by the Department between 1905 and the present time, there being shown the cruises of the *Galilee* in the Pacific Ocean, 1905–08, those of the *Carnegie*, 1909–13, and the stations on land at which the magnetic elements have been determined. It is seen that the work is so arranged that intersections of the cruises are repeatedly obtained, thus furnishing the necessary control on the accuracy of the observations and supplying data at the same time as to the secular change. The cruises of the *Galilee* in the Pacific, 1905–08, were intersected by those of the *Carnegie* in 1912, and those of the *Carnegie* in the Atlantic Ocean, 1909–10, by the cruises this year. The observations at the land stations are also repeated whenever opportunity affords, so that the endeavour is not only to get the required data for obtaining the distribution of the magnetic elements, but also to get the corrections necessary to reduce the whole work to a common epoch. We shall probably select for our first epoch January 1, 1910, as that date will be about midway between the initial work and concluding work of our first survey. Next year the *Carnegie* will start out once more and again get secular variation data, covering at the same time the large areas where observations have not been made previously. The aggregate length of the cruises of the *Galilee* (1905–08) and of the *Carnegie* (1909–13) will be about 140,000 miles.

In land expeditions it is intended to secure general magnetic surveys of regions where little or no work of this kind has been done. The endeavour is thus not to duplicate, but rather to supplement the data being obtained by competent organizations in civilized countries. For example, in India no work is done by the Department of Terrestrial Magnetism, other than comparisons with the instruments used by the Magnetic Survey of India. The line of stations seen extending from Pekin through China to Kashgar, thence across the Himalayas to the borders of India, was the work of one of my assistants, Mr. D. C. Sowers, a Fellow of this distinguished Society. He connected his work at Dehra Dun with that of the India Magnetic Survey.

Special mention should be made of the work done by two enthusiastic English magneticians, Professors Beattie and Morrison. These two gentlemen were associated with the Department in 1908–09, and, with the aid of the funds chiefly supplied by the Carnegie Institution of Washington, carried out the magnificent work in Africa you see charted. Another noteworthy expedition completed last summer by an Englishman, was that of Mr. Kidson, formerly assistant of the Magnetic Observatory at Christchurch, New Zealand, who made the overland trip across Australia from Adelaide to Port Darwin. Mr. Kidson is in charge of the general magnetic survey of Australia now in progress under the direction of the Department. In this connection it may fittingly be mentioned that the Department co-operated with the Mawson Antarctic expedition, loaning the required field magnetic outfits and providing for the training of the observers,

Messrs. Webb and Kennedy, by Mr. Kidson. The reports and observations received show that valuable magnetic work was accomplished on the Mawson expedition.

Reference should be made to other successful expeditions in more or less unexplored regions. We have the valuable series of stations by Messrs. Ault, Stewart, and Schmitt extending across South America along the Amazon and Ucayali rivers from Para on the east to Callao on the west. Note also the canoeing expeditions in Canada carried up to the 60th parallel by Messrs. Ault and Stewart, and supplemented during this summer by an expedition under Dr. Harry Edmonds into the region of Canada, south-west of Hudson's Bay, where it is supposed the focus of maximum total force is located. A few weeks ago I received information of the highly successful completion of a remarkable expedition across the desert of Sahara from Algiers to Timbuctu, by Messrs. Berky and Sawyer. Time permits but mere mention of other meritorious work accomplished—in Central America, Turkey, Asia Minor, and Africa by Mr. W. H. Sligh; in Alaska, Persia, and Asia Minor by Mr. J. C. Pearson; in China by Dr. C. K. Edmunds, in charge for the Department of the general magnetic survey of China; in Peru, Bolivia, and Chile by Messrs. Ault, Schmitt, and Power; in Venezuela by Mr. Power, who will ascend the Orinoco and connect at Manaos, Brazil, with the Amazon series of magnetic stations; in Labrador, Baffin Land, and Greenland by Dr. C. C. Craft, in co-operation with the Peary Arctic Expedition. At present, a Canadian member of the Department, Mr. H. F. Johnston, is engaged on a series of stations extending from Montevideo along the Parana, Paraguay, and Madeira rivers to Manaos, Brazil.

It is gratifying to add that, though these expeditions have at times been carried out under trying circumstances, at the risk of life and limb, with revolution rife in the country explored, or perhaps in regions rarely or never before, as far as is known, reached by white man, all this work, owing to the good judgment, care, and skill displayed by the leaders, has been accomplished without the loss of a single life. Let us hope that the observers in their future work may be equally fortunate! The slides showing typical views of the expeditions will give you some idea of conditions under which the observations must at times be secured. The total number of land stations 1904–13 will be about 2500.

And now a few words on the *results* of the ocean magnetic work. Owing to our methods, and our non-magnetic ship, the absolute accuracy attained is about 0·1° in the magnetic declination and the dip and about $\frac{1}{500}$ part in the force. Except for certain regions, it has been found that over the portions of the oceans chiefly travelled the errors in the charts of the variation or magnetic declination, used by mariners, are usually not over 2°. In general, however, the errors are systematic in their run, *i.e.* they are of the same sign over long stretches, indicating that the principal reason for the discrepancy between the charts and the observations

of our vessels is due to the secular change which had to be assumed to bring the charts up to date. If you recall the paucity of reliable data, it is remarkable that those who have had charge of the preparation of the charts have been able to do so well. We are having repeatedly demonstrated to us that the phenomenon of the secular variation of the Earth's magnetism is an exceedingly complicated one, and it is, therefore, not an easy matter to keep charts corrected up to date. In fact, with the issuing of new charts every five years, let us say, I have been led to question whether it is worth while to give the secular change on the charts except for localities where reliable and fresh data are available. In the Indian Ocean, where the secular change is not only large at times, but changes rapidly in amount with geographical location, the errors in the charted compass data amounted from 4° to 6°, according to the chart used. The errors in the charts of the lines of equal magnetic inclination have at times amounted to 5° and 6°, and in those of the magnetic force the errors have reached the second decimal C.G.S. units, hence, about one-thirtieth of the absolute value.

The secular changes indicated on the Indian Ocean charts had at times the wrong sign, so that any one using them would commit twice the error in attempting to refer to date the chart value of the magnetic declination. The difficulties encountered in predicting the secular change are well shown by the next slide, giving the secular changes in the declination and the dip at three typical stations, London, Boston, and Baltimore. A remarkable acceleration in the annual change of the magnetic declination is being experienced at present in England; the change (about 9 minutes) being now almost twice what it was ten years ago. This acceleration may perhaps be related to the possibility that the period of minimum value of the dip may soon be reached in this part of the globe; it has already occurred in the eastern part of Europe, and seems to be moving westward. The London curve given on the slide shows, for example, that the magnetic declination changed most rapidly towards the end of the seventeenth century, when the dip was passing through a maximum value.

However, my time is up, and I fear that your patience has already been overtaxed. In conclusion, permit me to thank you for this opportunity to present a summary of the work of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, and to express my appreciation of the patient attention given my remarks.

Sir DAVID GILL: We are all immensely indebted to Prof. Bauer for this interesting and instructive address. It brings to our attention the immense importance of organized effort backed by the means which have, so happily for the world, been placed at the disposal of such men as Mr. Carnegie. The conception of using a ship which is constructed entirely without iron and free from internal magnetic disturbance is of course an important factor, permitting the observers, as Prof. Bauer said, to arrive at their results an hour or two after the observations were made, and to communicate them to the world without

waiting for the data necessary to apply the corrections depending on the ship's attractions. It is most interesting to hear that the large errors which existed in some of the former charts are largely due to erroneous assumptions as to the amount of the secular change of magnetic declination. In fact, the old observations were often very good, the errors in the charts being due to erroneous assumptions as to the law or curve of secular changes.

Dr. CHREE: I do not know whether I have any question to ask. I had the advantage recently of reading the account which Prof. Bauer has published of his land observations, also the pleasure of seeing several of his observers, and the impression left on me has been exceedingly favourable. The observers' zeal in their work has been remarkable. I had also the pleasure of seeing Profs. Beattie and Morrison after their South African expedition. It was an exceedingly valuable piece of work, and supplemented their earlier African work to which Sir David Gill made reference. With regard to what is going to happen in terrestrial magnetism it is exceedingly difficult to form any forecast. I do not know whether Dr. Bauer thinks we are going to get down here to zero declination. Twelve years ago what we were beginning to doubt was whether the declination needle was not about to stop its easterly movement and go back. After steadily increasing for a generation, horizontal force in Eastern Europe began to go down, towards the end of last century, and whether it is now going down or up in the British Islands it is difficult to say. Sea instruments owe a great deal to Dr. Bauer and his staff, and the development of them has led to a great deal of valuable work being done at sea.

Captain CREAK: I should like to ask Dr. Bauer whether the instrument with which he makes observations for declination and horizontal force is a dry or a liquid one?

Prof. BAUER: We have experimented with both forms, and have decided on a liquid one.

Captain CREAK: With regard to the observations which have been made, I am strongly of opinion that when we want to make magnetic charts of the globe we must go to sea for a large portion of the data, for happily the major portion of it is covered with deep water. The first time a complete set of magnetic charts was made was by Gauss, who collected some ninety-six observations distributed over the globe, and from them calculated equal lines of the magnetic elements. The next series was for the epoch 1842–45 by Sabine, but these, as Dr. Bauer says, were adversely affected by the observations having been taken at times widely apart, and the values of the secular change often not known. Then came the *Challenger* results and the charts drawn from them. These were a very great advance on what we had had before, but we had not the luxury which Dr. Bauer has had with his non-magnetic ship. I know, from having gone through every detail, the great difficulty we had in correcting the *Challenger* results. We had as much as 11° difference between the values of the dip at St. Paul's rocks and on board ship, and in the Pacific there were 6° difference near the Equator. Another defect was that the results at sea were always relative. In the *Carnegie* the L.C. instrument gives absolute results for the force and dip as well. I think, on the whole, we may say that the results obtained in her in deep water are epoch-making in terrestrial magnetism, for the number of magnetic disturbances we often get on shore is so great that in any country it is difficult to determine what the normal values are. We know of the large disturbances also found in places near the land. At Cossack, in Australia, the declination differs 82° in an area of 400 yards, situated in 9 fathoms of water and 2 miles from the island of Bezout. Of course,

Dr. Bauer has very wisely got observers on shore to work with him, so that with the combined results of the observations at sea he will be able to find out the correct value of the Earth's magnetism for a given epoch, and we shall in future be able to see what the secular changes in the magnetism of the globe are. There is one thing I should like to say about the question of placing the secular change on charts. I think we must still put it on the charts for the best value we know for the sake of the sailor, to whom approximate values are sufficient for navigation. I would also remark that by "deep water" I mean depths of and above 100 fathoms.

I congratulate Dr. Bauer on the valuable work which is being done, and I take it as an epoch in magnetics that in a short time he will give us a valuable addition to our knowledge of terrestrial magnetism.

Captain TIZARD: I have nothing to add to the observations of Captain Creak. I can only affirm what he says, and I thoroughly agree with him that if we want the earth's magnetism properly ascertained it must be done at sea or on ice. It was proved conclusively during the voyage of the *Challenger* that a great many observations taken on shore were erroneous, and in one particular place, Bermuda, shore observation give a difference of from 4° to 11° in the variation in different parts of that coral atoll, a thing which could not have been anticipated. The true variation was attained by swinging the ship in the deep water outside Bermuda. We got good results always by swinging the ship in the deep water, and the *Challenger* was the first ship which did this constantly and systematically.

Dr. SHAW: I have little to add except to express my admiration for the success that follows upon having a special ship for a special job. I have been listening to Dr. Bauer with envy, having special jobs of my own that want special ships, but I do not know where to find a Mr. Carnegie or his representative in other departments of science. I am a little disturbed by some remarks that fell from Captain Creak and Captain Tizard that would seem to suggest about the observed magnetic effects of some localities of the globe that there is a right and a wrong, and if you are at sea you get it right and if you are on land you get it wrong. We might put it another way and call it local and non-local. It seems to me, if we want really to know about terrestrial magnetism we need to have the right and the wrong, that is to say, what happens at sea and what happens on shore. In connection with that, it is suggestive that the Carnegie Institution is joining up the many observations it has taken at sea with quite a large number of observations on shore, and I gather it is the magnetism of the globe that Dr. Bauer has in view, and not exclusively the magnetism of the sea or the magnetism of the shore. I was wondering, when looking at the charts, what the future ambitions of the Carnegie Institution are. All the cruises which are charted are between about 50° North and 50° South: there is a great deal of interesting magnetism north of 50° North and south of 50° South, and one would like to look forward to the *Carnegie* or some other ship, suitably designed, pursuing this elusive magnetism of the globe into those regions that are beyond the northern and the southern limits at present indicated. I may add my congratulations and admiration for the wisdom of the Carnegie Institution in attacking a definite problem with the deliberate intention of getting at the end of it.

Prof. BAUER: To begin with Dr. Shaw's question. The *Carnegie* is not built for the ice. The first year, 1909, we had planned to make a trip to Hudson's Bay and to investigate the magnetic conditions there, but owing to the fact that the vessel was not completed till the latter part of July, the trip had to be abandoned

for that year. Every opportunity is being embraced to co-operate with polar expeditions, and the Department is thus in touch with practically every expedition, which can include in its programme magnetic work. The result of our co-operation with the Peary and the Mawson expeditions has already been related. Similar co-operation has been entered into with Captain Amundsen's coming Arctic expedition and with the Canadian and the Crocker-Land expeditions starting out this summer. Not only do we supply the instruments, but we also undertake to train the observers and to give all requisite information and data. That appears to be the most feasible way at present of securing magnetic results in regions which cannot be reached with safety with the *Carnegie*.

I hope the day is not too distant when the non-magnetic airship will become a reality. It is, in fact, more difficult to make a magnetic survey of land areas than of ocean areas; one of the chief reasons for this, as already pointed out by Captains Creak and Tizard, is the prevalence of the local disturbances, on account of which it becomes necessary to multiply observations if a result fairly typical or representative of a certain locality is desired. Then there is the difficulty of transportation and travel in unexplored countries. All that we can aim to accomplish at present is the completion of a general magnetic survey of the portion of the globe traversed ordinarily by vessels and habited by man. The detailed study of the regions showing pronounced irregularities in the distribution of the magnetic elements, as well as some other interesting and more or less related questions must be deferred to a future time.

With regard to the use of a mechanical device, suggested by Dr. Chree for use in connection with the L.-C. dip circle observations, I may say that at sea it is not necessary to use the ivory scraper, furnished with the L.-C. dip circle, as much as on land. In sea work the needle, on account of the motion of the ship, is in continual vibration. We have made a number of interesting experiments on this point; however, the time is too far advanced to admit of citing our experiences in detail. Suffice it to say that it has been found distinctly advantageous to determine, whenever possible, each element of observation in different ways with instruments of totally different construction. Thus, although we have installed an earth inductor on board the *Carnegie*, we shall by no means, for the present at least, abandon work with the L.-C. dip circle, which we have found a very useful instrument. It is not always possible to say from experiments solely on land and on fixed supports whether the appliances will actually be practical for ocean work, and hence continual experimentation aboard, under the actual conditions of sea work, is absolutely essential. We hope thus ultimately also to solve the problem, already mentioned, of obtaining magnetic declinations on cloudy days with the aid of some appliance involving the principle of the gyroscope.

Referring to Dr. Chree's query, I may say there are many facts which show conclusively that the secular variation is an exceedingly complicated affair, and I am fully in accord with him that it is hazardous to make predictions long ahead as to the course of the magnetic needle. Thus, for example, although we have observations of the magnetic declination at some places from the sixteenth century to the present time, the curve cannot be extended back into the fifteenth and fourteenth centuries without encountering pronounced differences between the data so obtained and those derived from the so-called compass charts of that period. So again the remarkable changes in the amounts of annual change in the magnetic declination experienced now nearly the world over, could not have been predicted from the observations of ten, or even, in some cases, of five years ago.

In conclusion, let me express my gratification that the necessary steps have

been taken, by the appointment of a powerful Committee of the Royal Society, for an early resurvey of the magnetic elements over Great Britain. With such an excellent basis to work on as that of the Rücker and Thorpe magnetic survey of 1891, you, in this country, will be able to solve most interesting problems, as, for example, the effect of locally disturbed areas on the secular variation of the Earth's magnetism.

ON A PRECISE NOMENCLATURE IN SURVEYING.*

By Captain H. G. LYONS, F.R.S.

Triangulation.

In all technical work a precise nomenclature is of the first importance, and it is therefore remarkable to find how far surveying is from a uniform practice in this respect, for no one can read through the various accounts of the surveying operations which are being carried on in the British Empire without being struck by the great variety of the terms which are employed to describe operations of the same kind. As a result of this, the same term in different regions may connote work of very different degrees of accuracy; and conversely, we also find different terms being applied to work which is very similar in character. This state of things is distinctly disadvantageous, for it is difficult to follow the accounts of work which has been done in different areas, it is not easy to recognize the relations between work of different classes, nor to know what errors are reasonably permissible, nor what instruments, methods of computation, etc., are the most suitable in each case.

Surveying, being a science which is wholly occupied with physical measurement of different degrees of precision, has no excuse for such ambiguity; and since at the present time there is a very large amount of land measurement in hand in various parts of the Empire, it is the more desirable that a uniform nomenclature should be employed.

We may best illustrate the present practice by taking some examples from recently published reports of triangulation, where we find a rich variety of terms; the adjectives principal, primary, secondary, major, main, tertiary, minor, and even topographical and rapid, are all in use for describing classes of work; while we further hear of auxiliary stations which are distinct from points which are observed (intersected), but from which observations are not taken. But triangulation should be classified with respect to the accuracy attained, for the time and expense involved in work of the highest grade is justified by the effective control which it furnishes over the less precise and more economical triangulation which fills in the network of the large triangles of higher grade work.

Nevertheless, there is no general agreement which defines the degree

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* Read at a joint meeting of Sections A and E of the British Association, at Birmingham, September 15, 1913.

of accuracy which these various terms connote, nor is the procedure of making the observations or of computing the results even approximately deducible from these descriptive terms themselves. The first seven of these terms are relative, and are comparable only with the other classes of triangulation if they occur in the same area; the last two terms refer to the conditions under which the work is carried out. In illustration of this it will be sufficient to point out that the secondary triangulation of the Ordnance Survey is not the same as that which is called secondary triangulation in Trinidad. In a recent report of the Colonial Office Survey Committee,* main triangulation is reported from Southern Nigeria, but we cannot tell directly how this work stands in relation to the major triangulation or the secondary triangulation of other regions until we examine the detailed account of the operations, should this be available. In the same way the relation of the minor triangulation which is executed in various colonies to the tertiary triangulation of East African Protectorate or of Trinidad is not clear, since both fall within the class of less precise triangulation, which is controlled by operations of a higher grade.

In order to appreciate correctly the standard and the reliability of such work, we require to know the conditions which the observations had to fulfil in order that they might be accepted as satisfactory; that is, what the permissible errors in the different grades of work are; but the terms which have been already quoted are so differently employed in different regions that no conclusions as to the precision aimed at can be safely drawn from the term used to describe the triangulation. Reference is made to primary triangulation in the reports on Ceylon and Trinidad, but only approximate methods have been used in computing the latter, so this work at least cannot be of a high standard.

The fact is that all these terms are of local application only, and are comparable only with triangulation which has been executed with similar objects, under the same conditions, and subject to the same limitations.

It is, therefore, desirable that a more logical and intelligible system of classifying triangulation operations should be adopted, which will indicate the accuracy aimed at, for as soon as this is defined, the class of instrument, the number of observations at each station, the methods of reduction, the number of stations in a given area, all follow more or less directly, since they are conditioned by the accuracy which can be economically attained, having regard to time, cost, the staff available, the physical conditions, and the object for which the work is being carried out.

The highest grade of such a classification will be reserved for triangulation of the highest precision in which all computations will take into consideration the spheroidal form of the Earth; less precise work in which it may be considered as being practically spherical will fall into the succeeding categories; and the simpler operations where the sides of the

* *Colonial Reports*, Annual No. 730. London: 1912.

triangles are short, where the network is effectively controlled by a higher grade of triangulation, and where the portion of the Earth's surface may be treated as a plane, form the lowest group.

Present practice is far from following such an arrangement. The highest grade of triangulation of the Ordnance Survey and of the Survey of India is designated principal, but so also was a class of triangulation in Ceylon in 1907–8 and in the Federated Malay States, where the average error of closure in a triangle was 3″·5.

Primary triangulation has been reported from the Orange River Colony in 1909–10, from Ceylon, where it seems to be the same as that which was earlier called principal, and also from Trinidad.

Secondary triangulation is a recognized class in the Ordnance Survey and in the Survey of India, in both of which it is controlled by the Principal triangulation; in New Zealand it is the highest grade employed; in Trinidad, Ceylon, and Orange Free State, it stands next below primary triangulation; in Uganda and East Africa Protectorate it has been subordinate to main triangulation.

Tertiary triangulation is employed in the Ordnance Survey, the Survey of India, Ceylon in 1907–8, Trinidad, where the maximum angular error is fixed at 12″, and in the East African Protectorate.

Main triangulation has been executed in Uganda, and British East Africa, where it apparently was a grade superior to secondary triangulation; and it is now the highest class of triangulation in Southern Nigeria and in Fiji.

Major triangulation is now the controlling grade in the East African Protectorate and the Federated Malay States, and was so in Orange Free State, where it was probably of the same character as the secondary triangulation reported in 1908–9.

Minor triangulation is, or has been, executed in Orange Free State, East African Protectorate, Southern Nigeria, Ceylon, Federated Malay States, Trinidad, and New Zealand.

The confusion is made greater in some cases by a change of terms within short periods of time; for instance, in the report of 1907–8 the classes of triangulation in Ceylon were Principal, Secondary, and Tertiary, in 1909–10 Minor, and now Primary and Secondary.

In 1907–8 the Federated Malay States reported Principal and Secondary triangulation, but now Major and Minor. The East African Protectorate had Secondary and Main triangulation in 1907–8, and now employs Major, Minor, and Tertiary. Such changes doubtless indicate reorganization, but they are confusing, and even the newer terms are only relative.

This wealth of nomenclature is not helpful to accurate description, and the adoption of a very usual and satisfactory classification of triangulation, arranged in order of accuracy under the headings of First Order, Second Order, Third Order, and Fourth Order triangulation, would be a great improvement. These terms are already very widely used and have definite

meanings, since each of these classes has a well-recognized standard of accuracy, so that any piece of work may be concisely described as being of such an order, or as approximating to it, or as somewhat surpassing it. The comparison will not now be with other work in the same area, but with a recognized standard of precision in triangulation. It is quite convenient and intelligible to speak of a certain piece of major triangulation as being of second or perhaps third order, and of a piece of minor triangulation as being of the third or fourth order, for in describing the work in such terms, a definite conception of the accuracy, procedure, and character of the work is at once formed.

In every region where triangulation is employed, the terms now current may continue in use, but it will also be described as being of the order of triangulation to which the precision of the work corresponds. The definitions of the different "orders" of triangulation may be given as follows:—

"First Order" triangulation includes all work of the highest grade, such as is utilized for geodetic investigations, and for the controlling of the "second order," "third order," and "fourth order" triangulations dependent thereon, such as occurs in carrying out an accurate large-scale survey of a densely-populated region, especially where the boundaries of property have to be accurately located.

The mean error M of the angular measurement, as determined by Ferrero's formula, viz. $M = \sqrt{\frac{\Sigma w^2}{n \cdot 3}}$, where $w = 180 +$ spher. excess $-$ sum of angles and should not exceed 1″.

The sides of such triangles may vary in length from say 15 miles or 25 kilometres up to any length that may be required.

The instruments used are those of the highest precision, having circles from 8″ to 16″ or 21 cms. to 40 cms. in diameter; these are read by means of microscopes reading usually to 2″ on the micrometer drums, and to 0″·2 by estimation. Errors of division of the circles must be carefully investigated, and allowed for; observations are repeated with settings at various zeros, usually eight in number; and everything is done to reduce the instrumental errors to the lowest limit.

In Second Order triangulation the angular error of closure for any triangle should not exceed 5″. Here the sides of the triangles are usually from 6 to 12 miles or 10 to 20 kilometres in length, or they may be longer if there is no First Order triangulation to control it, and the second order then becomes a principal or a primary triangulation for the area concerned. The instruments usually employed are theodolites, having circles of 8″ or occasionally 6″ in diameter, their divisions being read by microscopes. Errors of division should be investigated and corrected. Observations are usually made at six zero settings.

In Third Order triangulation the maximum angular error of closure which is admissible in a triangle should not exceed 15″. In these triangles the sides are usually from 2 to 6 miles or 3 to 10 kilometres in length.

The theodolites used have usually circles from 5″ to 6″ in diameter, and the angles are read, preferably by microscopes, to 10″. Four different zero settings are used.

The computation for work of this class, if it is controlled by Second Order triangulation, can be carried out by Plane Trigonometry.

Fourth Order triangulation would not be used alone, but would be employed for filling in on the basis of a network of a higher order; the points are comparatively close since the sides are less than 2 miles or 3 kilometres long, so that it is mainly employed in cadastral work. The permissible error of closure in a triangle should not exceed 30″.

Theodolites having circles of 5″ or 6″ and read by means of verniers to 30″ are sufficient for this class of work. Two or three different zero settings may be used in observing.

There is no difficulty in classifying all the grades of triangulation under these orders, and "a Primary Triangulation of the Second Order" will describe work of a definite standard of accuracy wherever it may be executed.

Traverses.

Traverses are now being more widely employed than formerly, for filling in detail and providing control points within Third Order or Fourth Order triangulation. Traverse of a special kind has been utilized in forest regions where triangulation was impracticable, and here long lines were necessary, so they have been measured with special care. Such traverses have been called precise, rigid, primary, standard, and main. They differ from the shorter traverses used in detailed work in their length, and it will be convenient to restrict the terms primary and secondary to short traverses which are controlled by triangulation. Primary traverses are run as directly as possible from one triangulation point to another, while secondary traverses connect points which have been determined by primary traverses.

The traverses which replace triangulation where this is impracticable, and which are controlled only by astronomical observations at occasional points, may be called long-distance traverses; the method of running them and the permissible errors must be determined by the special circumstance of each case.

A VISIT TO THE ROCK-TOMBS OF MEDAIN-I-SALIH, AND THE SOUTHERN SECTION OF THE HEJAZ RAILWAY.

By FRANK G. CLEMOW, M.D., Physician, British Embassy, Constantinople.

This journey down the Hejaz railway was undertaken as a member of a commission sent by the International Board of Health in Constantinople, with the object of selecting the best site for a pilgrims' quarantine

station. The railway, though perhaps one of the most interesting in the world, is still little known as regards its southern portion, while at Medain-i-Salih are rock tombs of considerable interest, of which I was able to obtain a series of photographs. The country along this section of the line is of considerable geographical interest.

The country between Damascus and Ma'an is relatively well known and has been frequently described.*

Ma'an really consists of two villages, some considerable distance apart, known as Ma'an-esh-Sham and Ma'an-el-Hejazie (or Ma'an-el-Misr). The latter is nearest to the station, though nearly a mile from it. It is the larger of the two villages, and is said to be growing at the expense of the other. Both are typical mud-built Arab villages, well supplied with water and rich in gardens. A copious spring, yielding about 25 tons of water daily, and known as the Ain-el-Kelbe, exists about 500 yards away from the station, and many wells have been sunk in the neighbourhood, water being found in almost unlimited quantity at depths varying from 15 to 50 feet from the surface.†

Passing Tebuk, an important oasis and quarantine station, from there to Akhdar the line rises steadily; past Wady Ethil, a narrow valley of basaltic blocks and pinnacles; past Mustabka (499 miles); past the Zahr-ul-Ghrul, or "Back of the Fiend" (a mild and colourless version of the Batn-ul Ghrul farther north); and through a tunnel 200 yards long, out into the Wadi Akhdar, and so to the station of Akhdar, or Kelaat-i-Akhdar. Many valleys meet in this neighbourhood; inundations are frequent in winter, and the line has had to be carried for a considerable distance along a raised viaduct of twenty arches, each 10 feet wide.

Beyond Akhdar the land still rises; the line winds for some distance in the Wady Akhdar (or Wady-el-Izan), passes Hamis (515 miles), Dizad (533½ miles), and Muaddhem (548 miles), and at Dar-el-Hamra reaches its highest point, 3973 feet above sea-level. From here it descends to El Mutali (561½ miles), Abu-Taka (570½ miles), and El Muzhim (578 miles), and then enters the remarkable gorge known as the Mubrakat-en-Naka, or Gorge of the Camel Calf, through which it winds for some 18 or 20 miles, before coming to the level on the plain of El Hejr or Medain-i-Salih.

The photographs give, better perhaps than words can, an idea of the strange forms that the sandstone rocks have taken on in this remote region. Out of the ribbed surface of rolling sand spring, in endless succession, tall towers and pinnacles, gigantic hummocks and needles and soaring

* See *Geographical Journal*, vol. **32**, p. 570.

† The Commission analyzed these waters, as also specimens of water from Tebuk, Akhdar, Medain-i-Salih, and Hedieh. The results of the analyses, together with much other detailed information relating to this line, were published in articles by the author, in the *Revue d'Hygiène et de Police Sanitaire* for March and April, 1910, under the title "Etude sur la Défense Sanitaire du Chemin du Fer du Hedjaz."

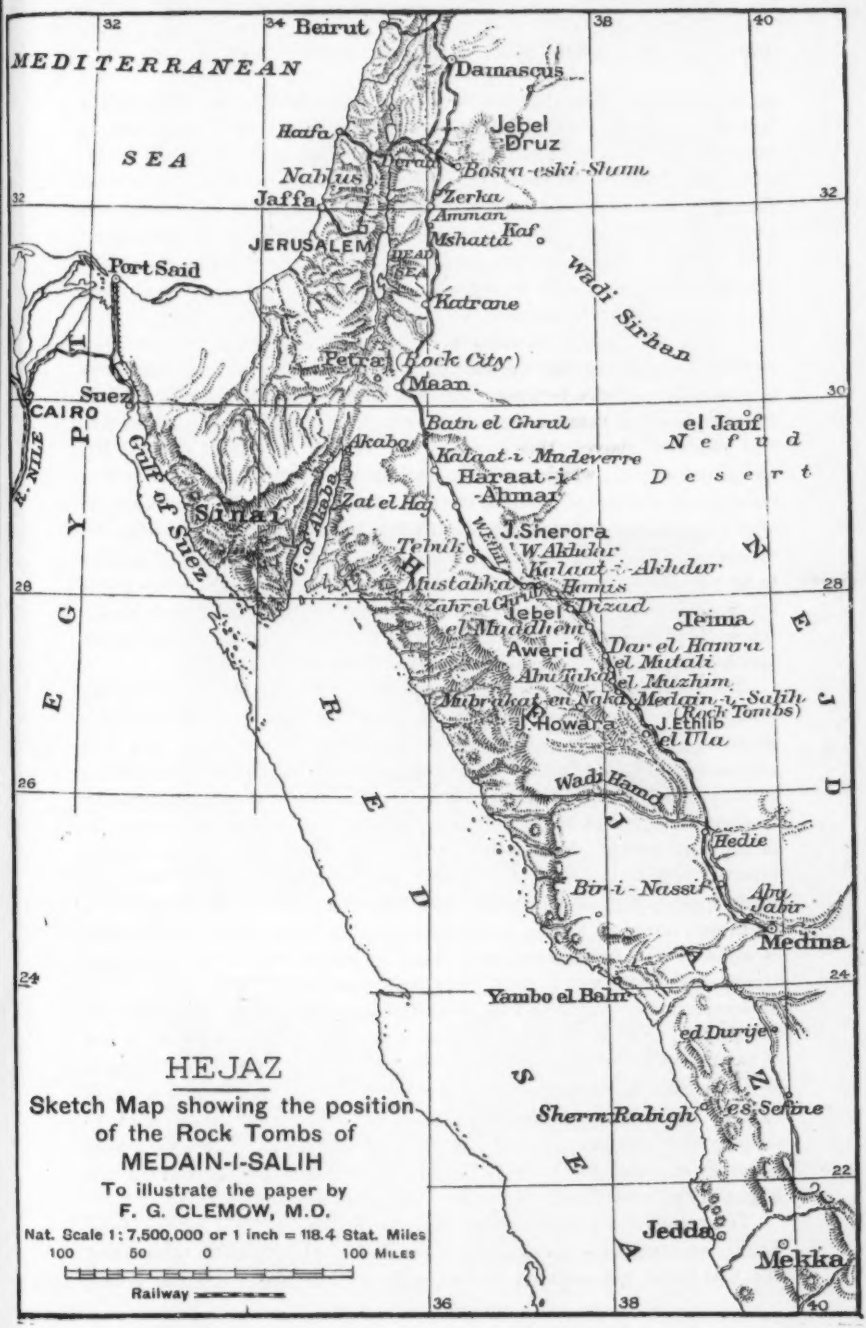
monstrosities of warm-hued rock, of every conceivable and inconceivable shape. They are separated by narrow chasms and clefts—fit lurking-places for *djins* and *ifrits*, *ghouls* and *marids*, and the thousand and one evil spirits of the vivid Arab imagination, and no less so for more corporeal dangers in the shape of evil-intentioned Bedouin. This gorge is on the Pilgrims' Way, and the hajjis have always passed hurriedly through it, uttering loud cries and firing repeated shots from their rifles and pistols to frighten away those lurking terrors.

A greater than they, the Prophet Mahomet himself, once passed through this gorge, and no less hurriedly, though for another reason. The occasion was that of the memorable expedition to Tebuk, so prominently mentioned in every life of Mahomet. He and his army were riding northwards, to fight some of the Syrian feudatories of the Byzantine Empire; they passed by this very Pilgrims' Way, and on reaching Medain-i-Salih the Prophet forbade his men, though tortured with thirst, to drink any water there, and then, muffling his face in his garment, he set spurs to his mule and galloped without stopping from one end of the Gorge of the Camel Calf to the other. The reason for this strange action is found in the legend which gives its name to the plain of Medain-i-Salih and to the gorge. This legend is, stripped of much of its miraculous detail, briefly as follows.

In ancient times these regions were peopled by the tribe of Thamud. Thamud, their founder, was, according to Arabian writers, fourth in direct descent from Noah, through his son Shem. Five generations later came the prophet Salih. The Thamudites rejected his teaching, and asked from him a sign from the Almighty; the request was granted, and accordingly the rocks in the Mubrakat-en-Naka opened and there issued from them a female camel, big with young. Two months later the camel gave birth to a calf, which was watered at the well now seen in the courtyard of the fortress at Medain-i-Salih, and called the "bir-en-naka" in consequence. But the wicked tribe still spurned the prophet, and impiously hamstrung and slew the mother camel. A terrible vengeance, however, followed; three days later a great noise shook the heavens, and the Thamudites were found lying on their faces, stone dead. The camel calf fled to the great table-rock of the Howwara, which still dominates the plain of El Hejr or Medain-i-Salih, and there the rocks opened and received the calf once more.

Arab writers have adopted this old-world legend as part of the Moslem tradition. It is referred to in no less than twenty chapters of the Koran, and is the title of the 15th *surah* of that book. Even to this day the plain of El Hejr and the gorge are, to those Moslems who know the story, as much under a ban as in the time of Mahomet.

At Medain-i-Salih are found a very wonderful series of tomb-cells and façades, carved in the sandstone rocks. The Arabs believe them to have been hewn by the wicked Thamudites in the time of Salih, and hence the name of "Medain-i-Salih," or the Cities of Salih. Sober history,



HEJAZ

Sketch Map showing the position of the Rock Tombs of MEDAIN-I-SALIH

To illustrate the paper by
F. G. CLEMOW, M.D.

Nat. Scale 1: 7,500,000 or 1 inch = 118.4 Stat. Miles

100 50 0 100 Miles

Railway

however, shows that they are of much later date and probably of the Nabatean period. These remarkable monuments were rediscovered in 1876 by Mr. Doughty, and have been described in great detail in his work on 'Arabia Deserta.' So fully and so correctly have they been pictured there by pen and pencil, that there is little left for later explorers to do but to admire the remarkable accuracy of the original observer. This is readily seen by comparing some of his illustrations with the photographic views here reproduced. The following are some of their most striking physical features.

Firstly, their size is remarkable. Some of the highest must be 70 or 80 feet in height, and they are wide in proportion. There is great similarity in general appearance between them all, but considerable variety in detail. In practically all there is a single doorway, with pilasters on either side and pediment above; this is set in a "façade" (a "frontispiece," Mr. Doughty calls it), which again has pilasters on either side, and is surmounted by a series of moulded cornices, while at the top is almost invariably the step-like ornament seen in the photographs. Such tomb-façades are seen in abundance at Petra, the capital of the Nabateans, and appear to be peculiarly characteristic of that race. On a few of the tomb-fronts are found inscriptions, which the labours of Doughty and Ernest Renan succeeded in deciphering and translating; and they show that these tombs were the burial-places of different Nabatean families.

The tomb-cell to which the door gives access is usually a rectangular chamber of no great size, and not much higher than an average man's stature. In the walls are many loculi or rectangular recesses, and it is curious that many of these seem to be much too shallow to have held a coffin, or even a body without a coffin. In others there are larger and deeper recesses at each end of the cell, and in some there are deep excavations in the floor at one or both ends of the chamber. The floor is usually littered with little heaps of rubbish; and among these may be found many human bones, morsels of wood, fragments of the wrappings of the dead, and lumps of a resinous substance which, there can be little doubt, is some of the frankincense and other spices in which the Nabateans traded and with which they embalmed their dead. The tomb-cell is always curiously small, and in particular curiously low in proportion to the height of the façade outside; but it is a remarkable fact that in one of the tombs a hole has appeared in the roof, and this has given access to an upper cell, in which the remains of forty or fifty dead bodies are said to have been found. If this is so in one instance, it seems reasonable to suppose that it is so in others; and should this prove to be true a very plausible explanation would be found of the disproportion between the height of the outer façade and that of the lower tomb-cell within.

The tombs are mostly carved in a series of rocks near to the Jebel Ethlib, on the south-east side of the plain of El Hejr. Away to the west the two great table-shaped rocks, covered with black volcanic *débris*,

A NABATEAN TOMB-FRONT AT MEDAIN-I-SALIH.

INTERIOR OF A NABATEAN TOMB-CELL AT MEDAIN-I-SALIH.

IN THE MUBRAKAT-EN-NAKA.

A NABATEAN TOMB-FRONT AT MEDAIN-I-SALIH.

THE HOWWARA AND THE PLAIN OF EL HEJR.

IN THE MUBRAKAT-EN-NAKA, OR GORGE OF THE CAMEL CALF.

called the Howara and Howeira, rise precipitously from the desert to a height of some 2000 feet. They appear to be the highest points in the Jebel Awerid range, which runs parallel with the line from the latitude of Tebuk to that of El Ula, 15 miles south of Medain-i-Salih. El Ula is a large village or small town, situated at the very foot of the Harrat-el-Moahib. There are said to be several springs there, some of good water, others yielding a hot, sulphurous, and scarcely drinkable water. The climate is considered unhealthy, and most of the population are said to suffer from a disorder allied to the Baghdad boil or Aleppo button.

From here the line continues to descend, until its lowest point is reached, a few kilometres north of Hedie, where the altitude is only 1132 feet above sea-level. The land then rises again. Hedie itself is at an altitude of 1312 feet; its waters are reputed as being among the worst to be found in any part of the line, and this was confirmed by the results of the Commission's analyses. Between Hedie and Medina inundations are frequent in winter, but the land continues steadily to rise towards the south, and at Bir-i-Nassif (800 miles) the altitude is 1706 feet, at Bir Jeber (805 miles) it is 1968 feet, and at Medina (809 miles) it is 2300 feet above sea-level.

These notes may be completed by some mention of the vegetable and animal life met with along the railway. Even in the most arid portion of the line some desert herbage, mostly in the form of blueish-green tussocks, dots the bare plain, and is not rare to see a tamarisk, a terebinth, or an acacia tree to break the monotony of the scene. Many times the air was full of a curious flying gossamer, in the form of longish white threads of delicate silky texture; no doubt the "winged seeds" of some herb of the desert, but in the brief searches we were able to make we never succeeded in finding the plant that was thus so lavishly seeking to perpetuate itself. In the wadies north of Ma'an—and of course in the gorge leading to Petra—pink oleanders abound. In the rare oases, such as those of Ma'an and Tebuk, date palms, figs, pomegranates, and other fruit-trees grow well. Further down the line, particularly in the Wady Akhdar, the wild colocynth is found in profusion, its vine-shaped leaves creeping along the ground, and its small mottled gourds, mostly detached and rolling free, were pleasant to look on in a barren land.

Nor is animal life less abundant. Scorpions may be found under many an innocent-looking stone; blue-grey insects, of most repulsive appearance, scutter across the sand; every now and then a flight of wild pigeons is seen, and the carrion crow is far from rare. Once a small owl sat and blinked on the telegraph wire, and paid little attention to the passing train; and once a flight of locusts, tabby-grey spectres, surrounded the train in countless myriads, and darkened the setting sun. In the Gorge of the Camel Calf gazelle were seen, skipping merrily from rock to rock; and more than once in the open desert the same beautiful animals were observed, dimly moving through the shimmering air, with a background

of pools and groves—the product of mirage. That rare creature, the so called "wild cow" of the Arabs, was only seen in captivity, at Ma'an; it is a species of antelope, the *Oryx beatrix* of science, and perhaps, it is said, the "reem" or "unicorn" of the Bible; yet, with its suggestion of a hump on the back, it might well claim some cousinship with the little Brahmani bulls of Benares.

Nor are traces of human life by any means lacking. There are no roads, it is true, nor even paths, across the desert; but at long intervals may be seen small heaps or low columns of stones, which have been set up by the Bedouin as landmarks in the trackless waste. Bedouin camps, with their low black tents and picturesque groups of Arab men and women, dogs and camels, are very occasionally seen from the train. Still more rarely a swift-trotting dromedary, or *thelul*, carrying the desert post, glides rapidly by. But in the 500 miles that separate Ma'an from Medina there would seem to be only two settlements worthy the name of village—those of Tebuk and El Ula.

The Commission did not travel further south than Medain-i-Salih, and the notes relating to places situated between there and Medina are of necessity based upon hearsay.

SIR AUREL STEIN'S NEW EXPEDITION IN CENTRAL ASIA.

By Sir AUREL STEIN, K.C.I.E., D.Sc.

In May last the Secretary of State's sanction was received for the long-planned expedition by which I wished to resume my geographical and archæological explorations in Central Asia and Westernmost China. H.E. the Viceroy and the Government of India had from the start accorded generous support to the plan. By the close of July I managed to complete in Kashmir the practical preparations for the journey, which is likely to extend over two years and a half. Much of my time was still claimed by work on the publication of the scientific results from my Central Asian explorations of 1906–08. In order to facilitate the extension of the proposed fresh topographical labours the Surveyor-General of India had kindly agreed to depute with me my experienced old travel companion, Rai Bahadur Lal Singh, Sub-Assistant Superintendent of the Survey of India, and to make available also the services of a second surveyor, Muhammad Yakub Khan, along with all necessary equipment and an additional grant.

For the initial portion of my journey, to the border of Chinese Turkestan on the Pamirs, I chose a route which was new to me and which had a special interest for the student of the geography and history of the Hindu-Kush regions. For long years I had wished to explore the valleys of Darel and Tangir, prominently mentioned in the accounts of

early Chinese Buddhist pilgrims who passed there on their way from the uppermost Oxus to the Indus and the sacred sites of the Indian North-West Frontier. The disturbed political conditions of the local tribal communities had rendered those territories so far wholly inaccessible to Europeans. But in recent years Raja Pakhtun Wali, of the Khushwakt family once ruling Yasin and Mastuj, had succeeded in gradually establishing a chiefship of his own among these small Darel republics. The friendly relations into which he had entered a short time ago with the Gilgit Political Agency opportunely enabled the Honourable Mr. Stuart Fraser, Resident in Kashmir, to secure the Raja's permission for me to visit those valleys. For the prompt use made of this chance I owe special gratitude to Mr. Fraser and the Indian Foreign Department.

Leaving the Kashmir valley on August 2, I travelled to Chilas on the Indus by the route crossing the high passes of Barai and Fasat. The bulk of our baggage was sent ahead with the second surveyor by the Gilgit road to await us in Hunza. It was a very useful precaution, for already on the first eight days the tracks followed proved in many places impracticable for laden animals. Apart from the appropriate Alpine training undergone here, I found an antiquarian interest in this route. There is good reason to assume that it was by this direct line of communication to the Indus that the Chinese obtained those supplies from Kashmir which, according to the record preserved in the T'ang dynasty's Annals, enabled them about the middle of the eighth century A.D. to maintain for a time imperial garrisons in the valleys south of the Hindu-Kush.

As soon as the hot and barren rock defile of the Indus was crossed, we found ourselves on ground offering ample scope for exploring work. Passing up the hitherto unsurveyed Hondur valley, with ruins of pre-Muhammadan times and plenty of abandoned cultivation, we reached the eastern border of Pakhtun Wali's latest conquests on the range overlooking the Khanbari river. Here we passed under the protection of the large and well-armed escort sent up by the Raja under his capable nephew, Shah Alim. Under a special stipulation no one from the Gilgit Agency was allowed to accompany us.

In order to avoid the excessive summer heat of the Indus gorges through which the usual route leads, I had asked to be taken to Darel by the mountains north-eastwards. It proved a difficult line of progress, but also one exceptionally suited for surveying operations. The great spurs descending from the Indus-Gilgit watershed, which we had to cross by a succession of high passes, furnished excellent plane-table stations. Extensive panoramic views were obtained towards the great snowy ranges across the Indus and on the headwaters of the Swat river, where trigonometrically fixed points could be sighted. Much hard climbing secured us similarly favourable conditions further on. It thus became possible, through R. B. Lal Singh's devoted exertions, to map within less

than a fortnight some 1200 square miles on ground which had never been surveyed or even seen by European eyes.

Work was facilitated by the excellent relations we were soon able to establish with Pakhtun Wali's trusted supporters forming our ever-watchful guard. Most of these alert fellows were outlaws from neighbouring territories, who had joined the chief's fortunes during the most adventurous period of his chequered career. They were themselves very interesting figures to study. There was also much to be learned among them about the time-honoured means and methods by which their capable leader, once a hapless refugee from Chitral, had carved out for himself this most recent of Hiudu-Kush kingdoms in true Condottiere fashion.

In the valleys drained by the Khanbari river splendid forests of pines and firs were found to clothe all the higher slopes. In places they had overrun the old cultivation terraces now abandoned, which could be traced everywhere in the wider portions of these valleys. Water for irrigation is abundant, and reoccupation is retarded only by the scantiness of population. In any case, it soon became clear that these mountain tracts enjoyed climatic advantages in the matter of adequate rainfall, conspicuously absent higher up on the Indus or elsewhere south of the Hindu-Kush.

The contrast with those denuded barren mountains to the north and east was even more striking when we reached the head of the main Darel valley. Among its magnificent pine forests and alpine meadows, I felt as if transported to Kashmir. But there was little chance to enjoy the fine alpine scenery while being constantly attacked by the fierce mosquitoes which infest all Darel and Tangir and cause bad sores even to local people. Even high up in the mountains we suffered severely from this plague.

On moving down to Mankial there revealed itself the openness of the main valley and the great extent of arable land. Much of the latter had passed out of cultivation long ago, and the great number of ruined sites fully accorded with this observation. The examination of these ruins kept me busy for several days. Most of them proved the remains of fortified settlements clearly of pre-Muhammadan date. By their construction on naturally strong rocky ridges bearing elaborately built terraces, and also by other features, they curiously recalled the extensive ruined settlements of the Buddhist period so numerous in the Swat and Peshawar valleys. It seemed like a distinct confirmation of the tradition preserved in the Chinese records as to the early historical connection between Darel and Swat. Near one of these ruins rapid excavation brought to light unmistakable remains of a Buddhist burial-ground in the shape of cinerary urns, metal ornaments, etc.

All archæological observations pointed to a much denser population than is now to be found in this territory. Yet even now Darel contains

a number of large crowded villages, and everywhere I came upon lingering traces of an inherited civilization a good deal superior to that of the neighbouring hill tracts. Thus the irrigation canals showed unusual skill in their carefully preserved solid stonework. On houses, mosques, and graves much fine wood-carving survives, showing decorative motifs which are directly derived from Graeco-Buddhist art as known to us from the ancient relievos of Gandhara.

The Darelis impressed me as a race weakened by centuries of internal disorder and needing a strong ruler. It was an interesting experience to meet Raja Pakhtun Wali in the castle he is building in the centre of his recently annexed territory and close to the site of its ancient capital. His human environment, like the methods by which he has established his rule, seemed to call up times long gone by. He showed every possible care to facilitate my journey, and I shall always think back with gratitude to the help and attention received, and with genuine interest to the ruler.

On my way down Darel, I was able to identify the site of an ancient Buddhist shrine where the Chinese pilgrims mention a miracle-working colossal image of Maitreya Buddha in wood. Continuity of local worship is attested here by a much-frequented Muhammadan saint's tomb. We then made our way westwards into Tangir by tracks difficult for load-carrying men. The trying climb was rewarded by the grand view opening from the Shardai pass, a truly ideal survey station. To the west it extended to the gap between precipitous snow-crowned spurs where the Indus makes its great bend southward. Independent tribal territory closes access to this famous defile; even from afar European eyes saw it now for the first time.

The Tangir valley, too, proved remarkably open and fertile. We visited there Jaglot, where Pakhtun Wali had established his original stronghold and withstood a memorable siege by the Gabarkhel tribesmen. Old animosities seemed to be still smouldering here, and special precautions were considered necessary to safeguard us from any fanatical attempt. In the great forest belt at the head of the valley hundreds of Pathans from Upper Swat and the Indus Kohistan were engaged in cutting the magnificent timber, a special source of revenue to the Raja. All arrangements worked smoothly to the end, and when on August 21 we had crossed the Sheobat pass, over 14,000 feet in height, I felt sorry to say farewell to Raja Pakhtun Wali's fascinating dominion and our hardy escort.

Our route now led due north through the mountain tracts of Gupis and Yasin. The former we entered by a pass, nearly 16,000 feet high, which had never been surveyed. The huge masses of rock *débris* left behind by ancient glaciers made it exceptionally trying, but it meant a short cut. In Yasin I found myself on the historically important route which forms the nearest connection between Oxus and Indus. There was

much to attest here Central-Asian influence. Besides interesting ruins of old forts, I traced Buddhist remains and much fine old wood-carving in houses, etc.

The glacier pass of Darkot, by which we crossed to the Yarkhan river headwaters, offered special historical interest as the gate by which a Chinese force despatched in 747 A.D. against the Tibetans effected its entry into Yasin and Gilgit. Considering the great natural obstacles, it was a remarkable military achievement, just as the successful passage of the Pamirs by a relatively Chinese army which preceded it. So it was a particularly gratifying find when I discovered a Tibetan inscription scratched into a large boulder on the track where it ascends a lateral moraine of the Darkot glacier from the south. It obviously is a relic of that Tibetan advance to the Oxus which the Chinese Annals record about the middle of the eighth century, and which the adventurous expedition just referred to was intended to stop.

Once beyond the Darkot our easiest route to the Chinese border would have led across the Baroghil saddle to the Oxus, and thence across the Afghan Pamirs. I had followed this route in 1906, and was, therefore, glad to move now by the parallel but little-known route which connects the headwaters of the Yarkhun and Karambar rivers with westernmost Hunza. On its south side it skirts an almost unexplored region of big glaciers and high ice-clad peaks. Other physical features, too, invest this route with special interest, but the obstacles encountered on this high ground are serious. So I had special reason to feel grateful for the effective help offered by Captain Stirling, commanding the Chitral Scouts, who joined me on the Darkot with fresh transport and accompanied me during four days' hard marching. Beyond we had a difficult task in getting across the Chillinji pass, *circ.* 17,400 feet above sea-level. The snow-slopes to be ascended were exceptionally steep, and had been rendered still more difficult by the snowy weather prevailing all through August. The great glacier over which the descent led proved fortunately less trying, and after thirteen hours' struggle over snow and ice we could bivouac in safety under the shelter of a moraine.

After this experience our progress though Hunza seemed easy. In the Chupursan valley the extensive areas of old cultivation furnished a feature of special interest. Neither want of water for irrigation nor climatic change seems to furnish an adequate explanation for their abandonment. Reoccupation is proceeding but slowly.

On September 6 we crossed the border of Chinese Turkestan by the Mintaka pass. I now found myself on ground familiar from two previous journeys. But the routes by which I had formerly reached it seemed quite "lady-like" compared with our recent tracks. During the five weeks since our start from Kashmir we had crossed altogether fifteen passes, between 10,000 and 17,400 feet in height, and nearly four-fifths of the total distance covered, over 500 miles, had to be done on foot.

Our descent along the Taghdumbash river to Tash-kurghan, the chief Sarikol settlement, was necessarily rapid. Yet I was able to use it, too, for fresh surveys of antiquarian interest. Thus I succeeded for a distance of over 40 miles in tracing an ancient canal of large size, long abandoned, but famous in local lore, which had once assured fertility to extensive areas along the right river-bank now almost entirely desert. It illustrates the great change which has come over Sarikol since the old Chinese pilgrims passed here.

After Tash-kurghan Kashgar was my immediate goal, and there I despatched my baggage by the usual caravan route through the mountains. I myself was anxious this time to reach the Turkestan plains by a new route, the valley of the Kara-tash river, which drains the great glacier-clad range of Muztagh-ata on the east. Owing to special difficulties this interesting ground has never been surveyed. The big floods from the melting glaciers make the narrow gorges of the Kara-tash river quite impassable in the spring and summer, and by the autumn heavy snow on the Merki pass equally closes the route to traffic. In the spring of 1906 my late surveyor, Ram Singh, had been completely baffled in his attempt to descend the valley. I was more favoured by chance now. An exceptional succession of early snowfalls had stopped the melting of the ice just in time to allow of my passage while the Merki Dawan was still open for laden yaks. But even thus the descent for two marches proved a distinctly difficult and in places risky business. The constant crossings of the river tossing between sheer rock walls could not have been effected without the opportunely secured Kirghiz camels, and none but these local camels could have negotiated such tracks as lead elsewhere along the foot of these precipices.

I was heartily glad when by September 19 we had emerged safely from the last of these gloomy rock gates, and a long ride two days later brought me back to Kashgar. There, under the hospitable roof of my old and ever-helpful friend, Sir George Macartney, K.C.I.E., now our Consul-General in Chinese Turkestan, I have been able to give my men a much-needed rest, and to complete the manifold preparations for our first winter campaign in the desert.

THE RECENT CROSSINGS OF GREENLAND.

THE years 1912–13 have been marked by an important advance in the exploration of the vast interior of Greenland, no fewer than three different traverses of the inland ice-sheet, one of them at almost its greatest extension in width, having been successfully accomplished ; * while the competence

* Four, if Rasmussen's outward and return routes are both counted.

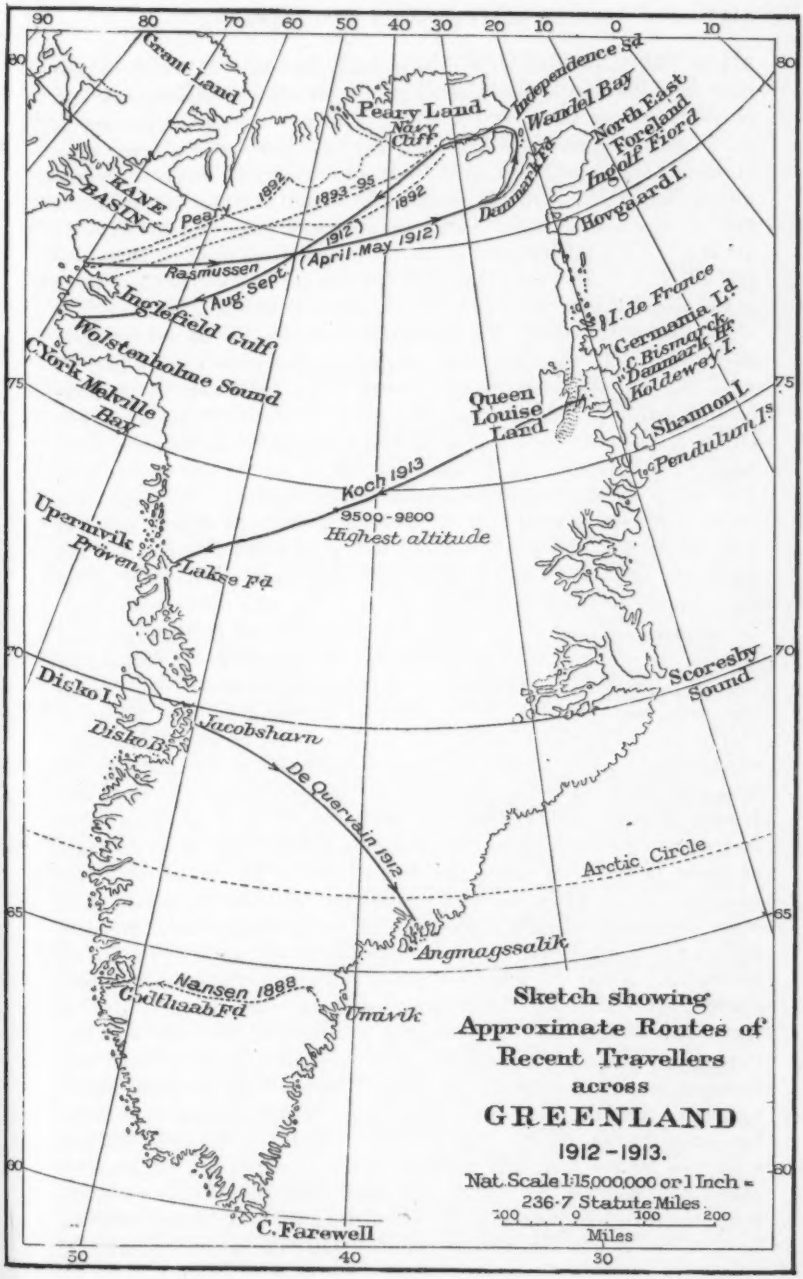
of the scientific experts who have taken part in the journeys makes it certain that the results, when fully worked out, will be of the greatest value from a scientific point of view.

The first of the three expeditions to start was that of Knud Rasmussen, who, with the young Dane Freuchen (one of Mylius Erichsen's men), had left Copenhagen for extended research in the Greenland region in July, 1910. Arrived at the scene of action, Rasmussen founded the station Thule in North Star bay (Wolstenholme sound), which is intended to form a connecting link between the Arctic Highlanders and the Danish settlements; and as a base for exploring and scientific expeditions.

In 1911, moved by anxiety for the fate of Einar Mikkelsen and Iversen, Rasmussen resolved to lead a relief expedition, but unfavourable conditions made it necessary to postpone the start till the next year. The party consisted of Rasmussen himself, Freuchen, Uvdloriark and Inukitsork, Arctic Highlanders, 4 sledges, and 53 dogs. On April 6, 1912, they started from the Clements Markham glacier, just north of Herbert island, Inglefield gulf. Ascending to the inland ice they made good progress. At first they built snow huts, but they soon found it much better to use their tent. On May 9, 1912, the head of Danmark fiord was reached, the dogs being still in good condition, though some were lost in the difficult descent from the inland ice. The highest point of the route was 2225 metres (7300 feet) above sea-level, and a total distance of 1230 kilometres (764 miles) had been covered. Travelling down Denmark, fiord the summer station of Mylius Erichsen was reached, but there was no record.* They continued their journey down the fiord until they reached the sea, and then proceeded up another fiord nearly due west, travelling at first along the south shore. Finding the coast barren and without game, they crossed to the north side, where there was more vegetation and where game was plentiful. There were traces of musk-oxen, hares and lemmings, birds in the air, and seals in the water, flowering saxifrage, and yellow poppies. There were marks of Eskimo tent places, but no winter huts. On June 17, they came to a steep glacier forming the end of the fiord, just to the north of Peary's "Navy cliff." In the place of the supposed Peary channel there is an extensive ice-free upland, abounding in game. Freuchen went up to Navy cliff, and found Peary's record, which stated that he was in sight of a fiord and named it "Independence." The party found it very difficult to ascend the steep glacier at the head of the fiord, which was named "Nyboe's glacier." On the north side there was a valley full of flowers which they called "Valmuedalen" (Valley of Poppies), and where they rested for a few days from July 12. Having shot several musk-oxen, they had plenty of provisions when they began the return journey of 1000 kilometres (621 miles) over the inland ice with 3 sledges and 27 dogs on August 8. Thule was safely reached on September 15, 1912.

The second party to start was that of the Swiss savant, Dr. de Quervain,

* It had been found and taken away by Mikkelsen.


Grant Land
Peary Land
Navy Cliff
Independence Sd
Wandel Bay
North East Foreland
Ingolf Fiord
Hovgaard I.
KANE BASIN
Peary 1892
1893-95
1892
1912
Rasmussen (Aug. Sept. 1912) (April-May 1912)
Danmark Fd
I. de France
Germania Ld
C. Bismarck
Denmark Fd
Koldewey I.
Inglefield Gulf
Wolstenholme Sound
York
Melville Bay
Queen Louise Land
Shannon I.
Pendulum Is
Koch 1913
9500-9800
Highest altitude
Upernivik
Prøven
Lakse Fd
Disko I.
Disko B.
Jacobshavn
De Quervain 1912
Scoresby Sound
Arctic Circle
Angmagssalik
Nansen 1888
Godthaab Fd
Umivik
C. Farewell
Sketch showing
Approximate Routes of
Recent Travellers
across
GREENLAND
1912 - 1913.
Nat. Scale 1:15,000,000 or 1 Inch = 236·7 Statute Miles
100 0 100 200
Miles

who in 1909 had visited Western Greenland, but had been forced to turn back from the edge of the inland ice. On his new expedition, organized in 1912, he was aided by Dr. Hössli, Professor Mercanton (an expert glaciologist), Messrs. Gaule and Fick, and Drs. Jost and Stollberg; some of whom, however, remained on the west coast to carry on scientific research through the winter. Leaving Copenhagen on April 12, 1912, the expedition first disembarked at Holstenborg, and proceeded thence in McClintock's old ship the *Fox* (afterwards lost) to the final starting-point on Disco bay (69° 43′ N.). Until June 20 the route led over the melancholy black rocks of the marginal zone, the march over the ice then beginning at an altitude of 600 metres (1970 feet). For the first 20 to 25 miles the ice was free from snow, with many water-holes and crevasses, which caused much trouble. After reaching the snow the party nearly met with disaster on a snow-covered lake. The highest point was reached on July 13 at an altitude of 2500 metres (8200 feet), and on the 17th a previously unknown mountain range was discovered near the east coast, which was reached on the 20th. The voyage to Angmagsalik was then made in kayaks. The expedition owed its success in great part to the endurance of the dogs, which had been obtained on the west coast, but had to be killed at the end of the journey by agreement with the authorities, in order to avoid risk of carrying a malady to which they are subject from the west to the east coast.

Intermediate between the routes of Rasmussen and De Quervain, and crossing the island at its widest, was that of Captain Koch, also one of the coadjutors of Mylius Erichsen. The personnel and stores of his expedition were landed in July, 1912, partly at Danmark harbour, partly at Storm cape. The leader had decided to depend for transport on ponies, of which sixteen were landed, but thirteen stampeded at once and only ten were eventually recovered. The various members of the party—Koch and Larsen, Wegener and Vigfus—were employed for over two months in transporting the stores across the northern part of Dove bay in the direction of Queen Louise Land, which had been chosen as the site of the winter quarters. Many difficulties were encountered, and the motor-boat sank when attempting to push a way through freshly formed ice. Wegener broke a rib on September 16, but was practically well again by the middle of October. A way was found with much difficulty up the much-crevassed glacier front to the surface of the great ice-stream which descends between Queen Louise Land and Germania Land, but many of the stores were lost through the calving of the glacier. The ice-sheet proved so rough and furrowed by watercourses that all hope of transporting the impedimenta to Queen Louise Land had to be abandoned. Winter quarters were therefore established on the ice. Captain Koch broke his leg through a fall into a crevasse 50 feet deep, and was laid up for three months. The winter passed well, however, in scientific and other work, and in their well-built house the party experienced no discomfort from the cold, though −58° C. (−72°·4 Fahr.) was registered. An excursion, on ponies, revealed a

practicable route over the ice, and in subsequent sledge-trips a depôt was established on the western side of Queen Louise Land, at a height of 3600 feet.

The final start on the 700-mile march to the west coast was made on April 20. During the first forty days only two were fine. For twelve the party were held up by a blizzard, and during the march had often to face violent storms. The ponies suffered severely, becoming snow-blind and exhausted, and three had to be killed. The men suffered from frost-bites, but these were not serious. The last nunataks of the eastern marginal zone were passed on May 6 in 27° W. long., and then no land was seen until July 2. As the centre of Greenland was approached, the wind moderated, veering more to the south and finally dying down. The altitude was between 8000 and 9000 feet, and the diminished air-pressure troubled both men and ponies, while the intense solar radiation, coupled with the low nightly temperature (minimum in June −29·2° C.) blistered the skin and caused sores. The greatest elevation—provisionally estimated at 9500 to 9800 feet—was reached in long. 43° W., lat. 74° 30′ N., or nearer the west than the east coast.

During the first part of the journey the snow was hard, but deeply furrowed, and when the surface became more even the ponies sank in the soft snow. The supply of fodder proving insufficient, four more had to be killed by June 11. With the westward slope the wind rose again, blowing from the south-east, so that a sail could be hoisted. On July 2 the first land was sighted—a nunatak 37 miles from the ice-margin. The slope became steeper and the melting snow formed surface pools connected by deeply sunk streams. On July 4 the margin was reached, and the cache made in 1911 was found, but the way being impracticable for the pony the last remaining animal was killed when only 6 miles from grass lands. In order to cross the Lakse (Salmon) river and fiord, a raft was constructed of the sledge and sleeping-bags, the men carrying it for five days over the mountains, without shelter from the weather. After crossing Lakse fiord the travellers encountered fog, rain, and mist, and lay weather-bound, without food, for thirty-five hours. Finally a sailing-boat was sighted on the fiord east of Prövен, and it proved to be the property of Pastor Chemnitz, of Upernivik, by whom they were happily rescued and taken to Prövен.

The observations made during the above expeditions, particularly the two last, are certain to throw much new light on the configuration and meteorological conditions of the great ice-filled interior of Greenland. Previous to 1912 the only crossings effected had been that of Nansen in the south (just below 65°, where the width is comparatively small) and of Peary in the far north; the former travelling from east to west, while the latter, starting from the west coast near Inglefield gulf, twice made the double journey—outward and return—between that point and Independence fiord. Starting from nearly the same part of the west coast,

Rasmussen appears, on the outward journey, to have diverged farther from the northern edge of the ice-sheet, and by pushing on to the head of Danmark fiord, considerably extended the ice-traverse; still further prolonging the crossing by continuing down Danmark Fiord to the open ocean. By tracing Independence fiord to its head he has added to his record, though the non-existence of Peary channel from sea to sea had already been made known by Mylius Erichsen. De Quervain's route, though slightly inferior in length, is valuable as supplying information on a part of the ice-sheet considerably to the north of Nansen's route, while Koch, whose ice-traverse is almost certainly the longest yet made, has for the first time thrown light on the vast central area. In the *Zeitschrift* of the Berlin Geographical Society (1913, No. 7) Dr. H. Spelthman gives a useful tabular view of the different crossings made hitherto—their length, duration, highest points, minimum temperature record, etc.* While Koch reached the highest elevation of all, as was to be expected, De Quervain's highest did not reach Nansen's figure, thus showing (if the observations of both travellers are correct) that the altitude does not increase regularly from the south towards the centre. Again, while all the rest have found the highest point nearer the east than the west coast (the damming back of the ice by the high ground to the east being specially noted by De Quervain), Koch found the reverse to be the case along his line of route.

Captain Koch's summary of the scientific work done by himself and his companions shows how much we may expect from the results when worked up. They include general information on the topography, vegetable, and animal life, and in particular the mapping of a good part of Queen Louise Land; study of the rocks of the nunataks and collection of specimens; observations of the movements, structure, and internal temperature of the ice; a complete meteorological record, kept by Dr. Wegener, and general observations on the climatology—especially the peculiar desert climate of the high ice-fields; photographs of mirage, aurora, polarization of light, etc., and observations on the zodiacal light, etc. It is noted that the snow bunting and tracks of foxes were found at the very centre of the ice-sheet.

BRITISH ANTARCTIC EXPEDITION, 1910–13.

Presentation of Medals.

At the meeting of the Society on November 10, 1913, when Mr. Raymond Priestley gave a paper on "The Work and Adventures of the Northern Party of Captain Scott's Expedition," the President presented the Special

* He accidentally gives the date of Koch's crossing a year too early.

SPECIAL MEDAL AWARDED BY THE ROYAL GEOGRAPHICAL SOCIETY TO THE MEMBERS OF CAPTAIN SCOTT'S ANTARCTIC EXPEDITION, 1910–13.

THE KING HUMBERT GOLD MEDAL, AWARDED BY THE ROYAL ITALIAN GEOGRAPHICAL SOCIETY IN HONOUR OF CAPTAIN R. F. SCOTT, C.V.O., R.N.

Antarctic Medals which the Council had awarded to all the members of the expedition, and to the relatives of the five men who perished.

At the same time the Italian Ambassador presented to Lady Scott the King Humbert Grand Gold Medal, awarded by the Royal Italian Geographical Society in memory of Captain Scott, with silver replicas to Mrs. Wilson, Mrs. Oates, Mrs. Bowers, and Mrs. Evans.

In opening the proceedings, the PRESIDENT said: Before we proceed to the business of the evening, which consists of the paper to be read to us by Mr. Raymond Priestley, there is a twofold ceremony that we have to perform; it consists of the presentation of medals, partly by the Royal Geographical Society, and partly by the Royal Italian Geographical Society at the hands of His Excellency the Ambassador, who has honoured us with his presence here this evening. You will remember that at our Anniversary Meeting in the summer, I had the melancholy pleasure of handing to Lady Scott the casket to contain the medals which had already been won by her illustrious husband. On the same occasion, I handed to Mrs. Wilson the Gold Medal which we had awarded to her husband, and among the recipients of our awards was Lieut. Victor Campbell, the Commander of the Northern party, whose experiences we are to hear to-night. But, following the example that has been set by ourselves on previous occasions, our Society has decided to strike and present to all the officers and men of the party, both the representatives of those who have died and those who are still living, a Special Antarctic Medal. This Medal has been constructed for us with as much skill as we could command, and on one of its faces it bears what I think those who see it will recognize to be an excellent likeness of Captain Scott, and on the other side of the Medal is a representation in relief of that noble and never-to-be-forgotten party of five as they started out with their sledge on the last journey to the Pole.

In presenting these medals this evening, or so many of them as are our gift, it is not necessary for me to recapitulate any of the incidents of that tremendous drama. This Society has had the opportunity of paying, and, indeed, I may say the whole nation has paid, its tribute to those men. We need not now revive the harrowing story of the past. If any one wishes to revive it, or read it again, he has but to acquire the wonderful book, one of the most dramatic stories that have ever been told, that has recently appeared, containing the entire narrative of the Scott expedition. I shall say nothing about that to-night, but will merely hand the Medals to the recipients.

The Medals, as I have said, are partly our own Medals, and partly the Medals presented by the Royal Italian Geographical Society. Perhaps before His Excellency makes the presentation on their behalf, I may describe the circumstances under which they are given. The Council of the Royal Italian Geographical Society decided in February last to award the King Humbert Gold Medal to the memory of Captain Scott, and

silver replicas to his four companions who shared his fate. The Secretary of the Italian Society wrote: "I am directed by the Council to ask whether the Royal Geographical Society would agree to act in the name of the Royal Italian Geographical Society, in order that the Medal be presented to such representatives of the families as may be entitled to receive them. The Royal Italian Society will consider it a special favour to make as plain and dignified as possible the accomplishment of our duty towards British bravery in the field of Antarctic discovery.'

The recipients of these medals from the Italian Society, as also of our own Antarctic Medal, will accordingly be: Lady Scott, Mrs. Wilson, Mrs. Oates, and Mrs. Bowers, the two latter being the mothers of two of the heroes who lost their lives. The widow of Petty-Officer Evans will not be able to be present, but her Medal will be transmitted to her. Along with the Italian Medals there are also Diplomas. The inscription in Italian on the Medal to Captain Scott is as follows: "Alla Memoria di Robert F. Scott, R.N., Giunto secondo al Polo Australe suggella colla morte la verita della scoperta, 1913." The inscription on the silver medals in Italian is: "Alla Memoria di (here follows the name of the recipient) Compagno di R. F. Scott, Nella Gloria e nel Martirio, 1913." The officers and Staff who are present to receive the Society's Medal will be: Commander Pennell, R.N.; Commander W. M. Bruce, R.N.R.; Staff-Paymaster F. R. H. Drake, R.N.; Lieut. H. E. Rennick; Surgeon Edward L. Atkinson, R.N.; Surgeon G. M. Levick, R.N.; Griffith Taylor; Frank Debenham; Charles Wright; Raymond E. Priestley; Apsley Cherry-Garrard. To the other officers, staff, and men who are not able to be present the Medals will be forwarded.

H.E. THE ITALIAN AMBASSADOR: Before I hand these Medals, I will ask you to accept my feeling of deep gratitude for the great honour which you and the Council of the Royal Geographical Society have bestowed on me, by enabling me to fulfil this duty on behalf of the Royal Italian Geographical Society, which I think I may say has faithfully interpreted the feeling of admiration of the whole Italian nation for the memories of the gallant heroes, who fell on the field of honour for the holy cause of civilization and science.

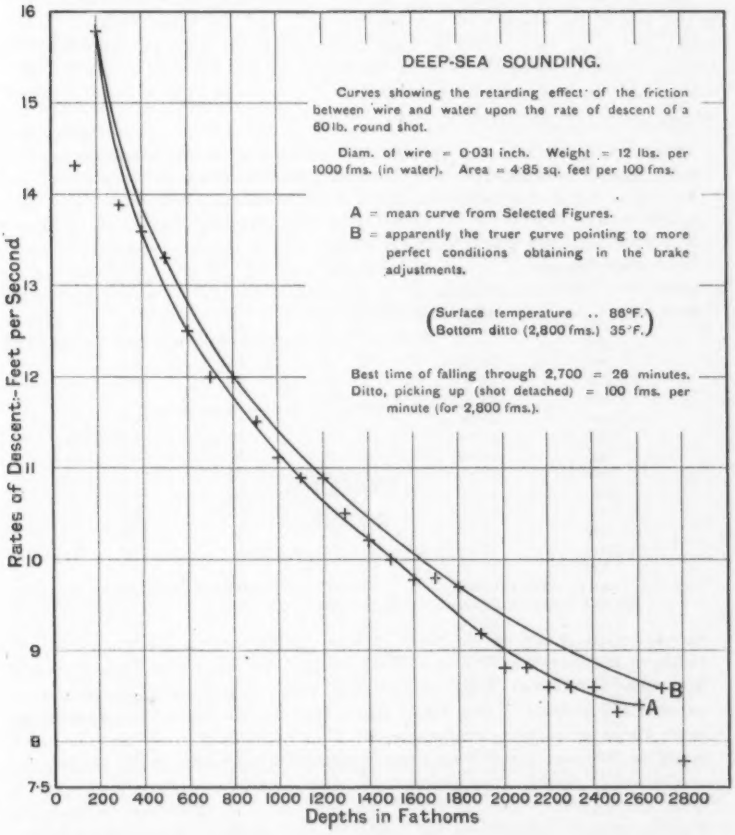
[The Ambassador then presented the Italian Medals, and the President the Society's special Antarctic Medals.]

The PRESIDENT: I should add that a telegram has been received from Prof. David of Sydney, geologist on Sir Ernest Shackleton's expedition, and intimately associated with the Australian expedition under Mawson, addressed to the President, as follows: "Best wishes from all, Mawson, Captain Davis, self, to members Scott expedition to-night's meeting.—DAVID."

COMMERCIAL SOUNDING.

By VERNON K. CORNISH.

THE accompanying sheets* and curves are among the results of a sounding expedition taken, some years ago, with the sole object of obtaining the correct depths, and a knowledge of the nature of the bottom, and reporting upon the same with as little delay as possible. With this end in view a Lucas sounding-


DEEP-SEA SOUNDING.
Curves showing the retarding effect of the friction between wire and water upon the rate of descent of a 60 lb. round shot.
Diam. of wire = 0·031 inch. Weight = 12 lbs. per 1000 fms. (in water). Area = 4·85 sq. feet per 100 fms.
A = mean curve from Selected Figures.
B = apparently the truer curve pointing to more perfect conditions obtaining in the brake adjustments.
(Surface temperature .. 86°F.
Bottom ditto (2,800 fms.) 35°F.)
Best time of falling through 2,700 = 26 minutes.
Ditto, picking up (shot detached) = 100 fms. per minute (for 2,800 fms.).
Rates of Descent:- Feet per Second
16
15
14
13
12
11
10
9
8
7·5
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600 2800
Depths in Fathoms
B
A

machine was used, 60-lb. round shot and No. 21 B.W.G. piano wire of 0·031-inch diameter, having a theoretical area of 4·86 square feet per 100 fathoms.

It seems evident upon inspection that the rate of descent is being affected

* These sheets, giving the soundings in detail, occupy considerable space, and it is not considered necessary to publish them as the evidence contained in them is summarized in the "Final Table."

at some points by excessive brake, but it is reasonable to suggest that at other points the shot is falling freely as far as the brake is concerned, and is affected only by the drag of the wire.

The curve is constructed from selected figures which have been collected together from the various soundings, and which are presented in the final table. The selected figures are those which indicate the highest velocities at the respective depths—it being accepted that the rate of descent will not be affected by a slack brake, or even an over-running drum.

Put forward in this manner, the figures emphasize the difficulties that stood in the path of the pioneers of deep-sea sounding, and also throw perhaps additional light upon what occurs in cable laying where we have an approximate surface of some 150 square feet, at the least, per 100 fathoms of descending cable. It is, further, easy to appreciate that, for the same type of cable, a yarn serving and a tape serving have vastly different effects.

FINAL TABLE OR SUMMARY OF THE RESULTS OF A SOUNDING EXPEDITION. SELECTED FIGURES SHOWING THE HIGHEST RATES OF DESCENT THROUGHOUT.

Total fathoms paid out.	Total area of wire submerged.	Time of falling.		
		Total.	Each 100 fathoms.	Rate of descent.
	sq. feet.	mins. secs.	secs.	feet per sec.
100	4·86	0 42	42	14·3
200	9·70	1 20	38	15·8
300	14·60	2 3	43	13·9
400	19·40	2 47	44	13·6
500	24·30	3 32	45	13·3
600	29·20	4 20	48	12·5
700	34·00	5 10	50	12·0
800	38·80	6 0	50	12·0
900	43·80	6 52	52	11·5
1000	48·60	7 46	54	11·1
1100	53·60	8 41	55	10·9
1200	58·40	9 36	55	10·9
1300	63·30	10 33	57	10·5
1400	67·80	11 32	59	10·2
1500	73·00	12 32	60	10·0
1600	77·60	13 33	61	9·8
1700	82·70	14 34	61	9·8
1800	87·60	15 36	62	6·7
1900	92·50	16 41	65	9·2
2000	97·20	17 49	68	8·8
2100	102·70	18 57	68	8·8
2200	107·10	20 07	70	8·6
2300	112·00	21 17	70	8·6
2400	116·90	22 27	70	8·6
2500	121·80	23 39	72	8·3
2600	126·70	24 50	71	8·4
2700	131·40	26 0	70	8·6
2800	136·40	27 17	77	7·8

Taking advantage of a slight personal acquaintance with the late Lord Kelvin, a copy of the curve was sent to him shortly before his death, and in acknowledging it he expressed his interest in the matter and his intention to give the figures his closest attention. With reference to sounding in general, it often happens, particularly when working off the mouth of a river, such as the Congo for instance, that the wire is observed to take sudden sheers, in the same

way as a fishing line will under the strain of a heavy fish, and if it is an authenticated fact, as it appears to be, that whales have fouled and parted cables while the latter have been in the process of being laid, there is no reason for questioning the idea that the intrusion of a cannon-ball into the privacy of deep-water life might occasionally arouse the anger of some great fish, which would attack on sight and probably cause the loss of the shot and some hundreds of fathoms of wire. On the authority of a recent article in the *Field*, it seems that the salmon is suspected of indulging in outbursts of temper over mere trifles, and a deep-sea monster is not likely to be more amiable.

It may be remembered by some that the cable steamer *John Pender* (the original boat of that name) had an experience on the above lines about eighteen years ago when sounding on the West African coast, and the paragraph that appeared in the daily papers was confirmed verbally by her officers to the effect that the wire was running out freely until the drum stopped owing to the shot striking bottom apparently, but the strain immediately came on again, the wire sheering about and finally breaking under heavy strain. It is conceivable that the foregoing phenomenon might be caused by the subsidence of the side of a steep gully (such as are traceable, even many miles seaward, of the mouths of rivers like the Congo), the irresistible rush of such an avalanche of mud snapping even heavily armoured cables. To digress slightly, a ship has been known to anchor unwittingly on the edge of one of these gullys in some 6 fathoms of water, and during the night the straining of the ship on her cable in a strong current has been sufficient to start the mud-slide, and away the vessel went drifting down-river with no bottom at 40 fathoms.

REVIEWS.

EUROPE.

Study of a French City

'Rouen: Etude d'une agglomération urbaine.' Par J. Levainville. Paris: Armand Colin. 1913. Pp. 418. *Maps, Illustrations and Diagrams.* 7 *fr.* 50.

This book, by the author of the valuable study of the human geography of Morvan published a few years ago, is another of the important geographical researches which we look for from time to time from the French school of geographers. It is the sort of work which might well be used to convince the sceptical that there is such a thing as research in geography, apart from research in the sciences from which the geographer borrows many of his facts. It suggests also the enormous amount of detailed work that is awaiting geographers to undertake it. The volume is divided into three parts. The geographical position and the site of Rouen are first studied, this entailing a consideration of physical factors. Then the activities of Rouen are noticed at considerable length and interpreted, while lastly come a consideration of the town itself and its evolution and the movements of its population. There is a long and seemingly exhaustive bibliography. A large-scale folding-map (Service Géographique de l'Armée) is added, as well as a plan of Rouen, but, as usual in French works, there is no index—a great inconvenience.

R. N. R. B.

Slav Settlements in Italy.

'Die Serbo-Kroatischen Kolonien Süd-Italiens.' By Milan Rešetar. (Schriften der Balkan-Kommission der K. Akademie der Wissenschaften zu Wien I., Heft 5.) Vienna: Hölder. 1911.

This instalment of the linguistic researches of the Austrian-Balkan Commission contains the results of Dr. Rešetar's examination (in the spring of 1907) of the settlements of Servian or Croatian origin in the south of Italy. After a summary of previous inquiries, and a short history of the older Slav settlements in Italy, comes a description of the settlement in the district of Molise, comprising three villages, whose inhabitants all speak still practically the same "Servo-Croatian dialect." The greater part of the volume is purely linguistic, and is supplemented by a number of folk-tales, songs, and other texts, with a full vocabulary. The section *Land und Leute*, however (pp. 91–136), gives a graphic account of the villagers themselves and their mode of life. Purely Slavonic physique has almost disappeared, but the people are still distinguishable from their Italian-speaking neighbours by their brown eyes and hair, and by characteristic physiognomy and expression; their mode of life is practically identical with that of South Italy, but they retain a good deal of non-Italian folklore and non-essential custom. This side of the matter, which mainly concerns the geographer, is treated but slightly here, and deserves separate and thorough investigation.

J. L. M.

Nationalities in Central Europe.

'Mannus Bibliothek, herausgegeben von Prof. Dr. Gustav Kossinna. Würzburg: Kabitzsch. Band 6–11. 1911–13. Various prices from 1.50 Mark to 12 Mark, with reduction to subscribers to the whole series.

It is only possible to notice briefly the second group of monographs issued in this series. Like their predecessors they represent contributions to the early history and prehistoric archæology of Central Europe, from the nationalist standpoint which Dr. Kossinna and his colleagues have already made sufficiently familiar. We are not without analogous enterprises in these islands, "Celtic" history, "Celtic" archæology, and other manifestations of the "Celtic" point of view, written by "Celts" for "Celts," and not always wholly intelligible to those who lack the "Celtic" temperament. For Dr. Kossinna, every nationality is entitled to an "archæology" of its own, conformable to its genius and destiny. In *Die Deutsche Vorgeschichte* (No. 9), for example, Dr. Kossinna is writing, as he says, for any one who has enthusiasm for *our* antiquity, "für Germanentum, und für wahrhaftes Deutschtum, wie es *unsere* Augen sehen." What would happen if two such national "archæologies" were to arrive at incompatible conclusions from the same evidence (as used to happen with nationalistic "philologies" in the seventies), is not clearly revealed, but we remember the fate of "Brown of Calaveras" in the society "upon the Stanislow." Even within a nationality, moreover, there may be diversities of operations. Dr. Kossinna's *Herkunft der Germanen* (No. 6) is mainly polemic against Dr. Eduard Meyer of Berlin, who apparently does not always see things Germanic "wie es unsere Augen sehen." In the same way, even topics so abstract as the application of spiral ornament to Greek and "Thracian" pottery (No. 1), or the relations of the builders of megalithic monuments to Oriental culture (No. 7), do not appear to everybody quite in the same light as they do to Dr. G. Wilke; there will be archæological Armageddon (I fear) in the Balkans as soon as it is safe to open that kind of trenches there. But it would be unfair to the

distinguished authors who have collaborated in this series to pretend that the theories, which peep out here and there, do more than add spice to the feast. The man in the street naturally wants to know what prehistoric archæology has to do with himself, before he can take an interest in it. In the volumes of the *Mannus-bibliothek*, there is no doubt of the answer to that, and for ninety-nine readers out of the hundred nothing but good can come of it. And for the hundredth reader, to realize that a "tendenz" is there, is the best precaution against being misled by it.

For geographers, nearly all these essays are of interest, dealing as they do with the distribution of phases and elements of culture, such as the primitive looms (No. 2) and houses (No. 11) of Europe, or of artistic and industrial traditions as in Dr. Wilke's volume (No. 10) on the relations which he detects between primitive Europe and the Middle East. Not every one, however, will accept all his comparisons as valid. Dr. Eric Blume's monograph on early Germanic culture between Oder and Passarge (No. 8) perhaps shows the method and its results at their best; it is an admirable piece of archæological synthesis, leading to clearly geographical distributions.

J. L. M.

Early Man in Europe.

'Palæolithic Man and Terramara Settlements in Europe.' By Robert Munro, M.A., M.D., LL.D. Pp. xxiv, 508. With 75 plates and 174 figures in the text. Edinburgh: Oliver and Boyd. 1912.

This substantial volume contains the substance of two courses of lectures delivered by the author on the Munro Foundation at Edinburgh, and as Dalrymple Lecturer at Glasgow. The former (Part I) surveys very fully the whole of the evidence for the distribution of palæolithic man in Europe, and discusses more briefly the larger problems suggested by early human traces elsewhere. For geographers the most important chapters are those on the Ice-Age (II), and on the extent of land-oscillation in Europe in quaternary time (IV), and on the transition from palæolithic to neolithic conditions (XI). The latter half of the book (Part II) reviews the additions which have been made to our knowledge of the Terramara settlements of North Italy, since the publication of the author's 'Lake Dwellings of Europe' in 1890; it discusses also the ethnological problems which are raised by the contrasted civilization, and particularly by the funerary practices, of the "Terramaricoli" and the Italian aborigines among whom they spread, and is accompanied by a bibliography of Terramara literature which is practically complete. There is a full index and ample illustration throughout, every one who is interested in the early stages of civilization in Europe will welcome this restatement of the matured views of one who has done so much for the subject as Dr. Munro.

J. L. M.

'The Radley District.' Edited by Rev. T. Field, D.D. (Oxford: Parker & Son, 1912. Pp. 123. 2*s. net.*) The warden of Radley college is the editor and part author of this small and unpretentious volume, dealing with the history, botany, entomology, and geology of the district around his school. The book is intended for Radley boys with the laudable aim of interesting them in the country-side and the observation of nature, and being written in simple and non-technical language should fulfil its object. A further chapter on the bird-life would have been an advantage.

'Hampstead Heath: its Geology and Natural History.' By Members of the Hampstead Scientific Society. (London: Fisher Unwin. 1913. Pp.

328. *Maps and Illustrations.* 10*s.* 6*d.*) Here is a volume which can hardly fail to interest any Londoner, for though it is cast on scientific lines, there is much matter in it that is intelligible to the unscientific reader. Its compilation has clearly been a labour of love for the subject on the part of the various contributors, who include Messrs. H. R. Maynard and C. J. B. Findon (who write cleverly on the topography of the heath and its surroundings), Mr. Rudler on geology, Mr. E. L. Hawke on climate, Messrs. A. G. Tansley, H. B. Watt, and W. A. Whitton on various departments of botany, Messrs. H. Goodchild and H. Findon on birds, mammals, etc., respectively, Dr. F. O'B. Ellison on insect life, Mr. H. Findon on molluscs, and Mr. J. Burton on bird-life. The whole is carefully edited and unified, and forms a very noteworthy record of minute study; it is built up from a proper topographical foundation, and if criticism be not ungenerous it can only be directed (from the geographical standpoint) at the maps, which bear perhaps too clearly the imprint of the amateur.

'The Passing of the Turkish Empire in Europe.' By Captain B. Granville Baker. (London: Seeley. 1913. Pp. 335. *Map and Illustrations.* 16*s.*) This book discloses much historical erudition, and though it is based upon a journey whose incidents are narrated, the historical is the chief interest in it. The author illustrates it himself with line sketches and half-tones. A map is given, which, though not very clear, will presently possess no little historical value, for it illustrates, by shading, the territory, till lately Turkish, occupied by the Balkan ex-allies in the recent war.

'Travel Pictures: the Record of a European Tour.' By Bhawani Singh, Raj Rana Bahadur of Thalawar. (London: Longmans. 1912. Pp. viii., 287. *Illustrations.* 6*s. net.*) A Continental tour, undertaken in 1904, by the Raj Bana of Thalawar, prompted the publication of this modest volume of *impressions de voyage.* Bhawani Singh's observations are occasionally instructive, and, thanks to the simplicity and sincerity of the style, generally readable. He is evidently an omnivorous reader of guide-books, and most of the information is familiar enough. The persevering reader will, however, occasionally light upon some little-known fact. We should like, by the way, to learn his authority for the curious statement that the circular opening in the roof of the Pantheon at Rome (probably meant for lighting purposes) was originally intended as a means of exit for an eagle bearing the souls of the dead buried in this pagan temple.

ASIA.

Tibetan Borderlands.

'The Land of the Blue Poppy.' By F. Kingdon Ward. Cambridge: University Press. 1913. Pp. xii. and 283. *Maps and Illustrations.* 12*s. net.*

The borderland of Western China and Eastern Tibet is one of the most interesting parts of Asia. For a long time entry into Tibet from this direction was closed by the hostility and exclusiveness of the lama rulers of the country, who not unnaturally resented intrusion by Europeans, and even by Chinese, fearing that any influence from outside might threaten their own power.

This state of things has been considerably modified by the result of the Tibetan rebellion of 1905. In this rising both Chinese officials and French missionaries were killed, and the Chinese Government, awaking to the seriousness of the outbreak, sent an army to put it down. There was much severe fighting, for the Tibetan, though ignorant of the art of war, has plenty of courage. In the end the better organization of the Chinese prevailed, large numbers of the lamas were killed, and many monasteries destroyed. For the present, at all

events, the traveller finds Chinese garrisons established where Tibetans were formerly supreme.

Happily for geographical science, several travellers have taken advantage of this extension of Chinese rule to add to our knowledge of these regions. Captain Bailey has recently passed through this part of Tibet to Assam—the first European to accomplish this feat, for Prince H. d'Orléans and Mr. E. C. Young both took more southerly routes without touching Tibetan territory. M. Bacot and other French travellers have also contributed to our knowledge of this country, and now Mr. Kingdon Ward has given an account of his journeys on this frontier during a period extending from April to December, 1911. The result is a very interesting and readable book, which adds considerably to our previous information.

The author has a great gift for describing scenery—a fortunate circumstance for a traveller in such a magnificent country. In the six months that he spent in his botanical researches he was able to see a good deal of hitherto undescribed country, and his observations on the forests, the geographical features, and the climate of this region are both interesting and valuable. His sympathetic descriptions of the tribes he met with also add to our knowledge, especially as to their home life and customs. In one instance Mr. Ward is at variance with Prince H. d'Orléans, the only previous authority on a tribe called Lama,* whom Prince Henri considers very closely allied—at all events, in language—to the Min-chia. The emphatic denial of this connection by the tribesmen themselves does not really preclude the possibility of their common origin, and Mr. Ward seems to have overlooked the fact that Pe-tzü is merely the name applied to the tribe whom the Chinese call Min-chia.

One cannot help regretting that the author was not accompanied by a companion with a plane-table, who might have filled up many of the blank spaces on the map; but Mr. Ward is a botanist, and at the time of this journey had not qualified himself as a surveyor, so that we must be thankful to him for having spared time to make rough sketches, which will certainly be of use. The spelling of Chinese names does not seem to be the author's strong point. Wade's system is doubtless not perfect, but it is now so generally adopted by English travellers that it seems a pity not to adhere to it for Chinese names. It cannot, of course, be necessarily used for Tibetan or tribal names.

The author's photographs are excellent, and well illustrate both the country and its inhabitants. Those who have already travelled on this borderland will sympathize with Mr. Ward in his desire (since gratified) to return there, and those who have never visited it may well be tempted by the author's admirable descriptions and photographs to undertake the journey. H. R. D.

AFRICA.

British East Africa and Uganda.

'A British Borderland: Service and Sport in Equatoria.' By Captain H. A. Wilson. London: John Murray. 1913. *Illustrations and Sketch-map.* 12*s. net.*

Captain Wilson spent the period 1902–1906 in British East Africa and Uganda, serving part of that time on the Anglo-German Boundary commission. He has considerable literary gifts, and his descriptions of the country bring before us definite pictures not likely to fade quickly from memory. The flavour of the book is of the past, for in East Africa there have been considerable changes since

* Not to be confused with the word meaning a Tibetan Buddhist monk.

1906. The author, however, has kept abreast of the times and in his closing chapters he discusses the future of "British Equatoria," as he calls it, in the light of the present situation. In the absence of any proved mineral wealth (save soda), the future of the Highlands must, he holds, be purely agricultural and pastoral, and he thinks current prices of land are unduly inflated. Moreover, he does not regard the Highlands as absolutely "a white man's country." All that Captain Wilson says on this subject is worthy of careful consideration. In the main he agrees with Lord Cranworth in thinking that the place of the white man in the country is that of an overseer. Religions and missions are the subject of a highly controversial chapter, the author's standpoint being that "religion is, or at all events has been, a retrograde force." What the natives need, he asserts, "are missions entirely secular and industrial." An excellent chapter is that called "A Day's Work," in which a realistic sketch is drawn of the multifarious duties which devolve upon the outpost officer, who, if not the Lord High Executioner, is certainly the Lord High Everything Else. The chief concern of the author is however with sport, and to the big game hunter this volume should make a strong appeal. A better map might have been given with advantage.

F. R. C.

Portuguese East Africa.

'Mozambique: its Agricultural Development.' By Robert Nunez Lyne. London: T. Fisher Unwin. 1913. *Illustrations and Maps.* 12*s.* 6*d. net.*

Portuguese East Africa, the province of Mozambique, as it is officially styled, is, for administrative purposes, divided into three sections. The northern region is administered by the Nyasa Company, and a large area south of the Zambezi is ruled by the Mozambique Company. The remainder, consisting of the districts of Mozambique, Quilimane, Tete, Inhambane, and Lourenço Marques is controlled directly by the Governor-General of the province. In the book under notice it is of the regions—Tete excepted—under the Governor-General that the author treats, though references to the lands under the rule of the companies are also given. For eighteen months Mr. Lyne filled the post of Director of Agriculture for the province. He had previously held a similar post at Zanzibar, and is therefore well equipped for the task he has undertaken. The main part of his book deals *seriatim* with the agricultural products of Mozambique—sugar, the coconut palm, rubber (*Cerea* and *Landolphia*), fibre, tobacco and cotton, cereals, fruits, cattle breeding, dairying, etc. As a guide to those who may wish to take part in the development of the province, Mr. Lyne's presentation of what is being done and what might be done will prove invaluable. What is being done, considerable in itself, is negligible compared with what might be done. "Save for a few specks, the whole of the immense territory lies fallow."

Mr. Lyne has, however, given us a great deal more than an agricultural treatise. In addition to a topographical sketch of each of the districts whose agricultural resources are described, there is a brief general survey of the province. An attempt is made to explain the regularity of the conformation of the coast-line. It is, the author believes, the result of the action of the rivers and of the winds and waves. Wind and wave are co-operating in the building up of sand-dunes, which advance seaward faster than the deltas formed by the rivers; hence a succession of bulges and bights. Attention is called to the advantage the province has over other parts of East Africa in its river system. Its rivers are not only numerous, they are well conducted—from the agriculturist's point of view. They "flow lazily through valleys which they themselves

have built up with the rich alluvial deposits borne upon their waters. The land thus made is easily irrigated." Again, the importance of climate in determining the value of soil is insisted upon. Thus from soil pronounced by a great expert to be "of a miserably poor character," and "clearly quite impoverished," luxuriant vegetation was obtained, owing to its well-balanced supply of sunshine and rain.

Few people have written as sensibly as does Mr. Lyne on the subject of native labour, which he shows to be largely a geographical problem. He bids us study the manner in which the clove industry of Zanzibar was built up and worked by the Arabs. The Arab was content to get his cloves picked, he "never set a task . . . his labourers went out to pick cloves, and some brought in five measures and some fifteen; but all received a like recompense in money, food, and clothing." And to-day it is impossible better to please a gang of East African labourers than by overlooking individual shortcomings.

The hindrances to commerce caused by indefensible fiscal laws and by monopolies, are shown, as well as the waste entailed by the prazo system. In an appendix the land laws of the province are printed in full. The illustrations are good, but the map supplied is of little use.

F. R. C.

Morocco.

'Le Maroc.' By Augustin Bernard. Paris: Felix Alcan. 1913. Pp. 412.

We welcome this work on Morocco with great pleasure. Not only is it the first book dealing systematically with all the geographical aspects of the region, but it is also a history of civilization in Morocco. The fact that these two subjects—so intimately bound up—are discussed in the same work greatly enhances the value of the treatment of each. Prof. Bernard has, of course, a profound knowledge of North Africa, but he also possesses the geographical sense in a high degree. Thus, in the chapters on the human population, we find not merely a description of manners and customs, such as has often been written before, but rather a concise account of the human geography.

In the first chapter the author points out the importance of the position of Morocco, and lays stress on its advantage—climatic and economic—over Algeria and Tunisia, in having an Atlantic as well as a Mediterranean aspect. Politically, in the past Morocco was a mere "geographical expression," but the fact that the Barbary States taken together form the true natural region is not lost sight of. Moreover, as might be expected, allusion is made to the probable political unity of the entire region in the future.

The sections which deal with physical geography—relief, climate, and vegetation—are short, but clear, and they include the fullest general description of the vegetation which has appeared as yet. There are also some interesting suggestions as to the husbanding of vegetable resources, and the prevention of depredations by man and beast. A review of the present knowledge of origins, ethnic and linguistic, in Morocco shows that archæological work, as yet, has done little more than formulate the main questions.

The historical part, from Phœnician times on to the modern political history, occupies one-third of the work, and nearly the same space is given to those chapters on human geography mentioned above. These describe vividly and clearly the salient features of the life of different sections of the people, and the geographical aspect is kept in view throughout. Thus, while other authors are freely quoted, the quotations—which include many of those perfect word-pictures of de Foucauld—are greatly enhanced in value, inasmuch as they are introduced, not haphazard, but in illustration of points in the human geography.

The book is illustrated by five sketch-maps, three of which are new editions of those which appeared in Mons. Bernard's earlier work, 'Les Confins Algero-Marocains.'

A. G. O.

'Reminiscences of a South African Pioneer.' By W. C. Scully. (London: Fisher Unwin. 1913. Pp. 320. *Illustrations.* 10*s.* 6*d.*) Reminiscences of a land like South Africa, where political and economic conditions have changed out of knowledge within human memory, are worthy of record, however personal and individual. The writer seems to carry us much further back than the mere tale of years would suggest, when he writes in his seventh chapter (to quote a single example) of the country of the Crocodile, Olifant, Limpopo, and other rivers as one unmapped, whose "geography was but vaguely rumoured of." The traveller and the sportsman will find interesting reading here.

AUSTRALASIA AND PACIFIC ISLANDS.

Islands of the Western Pacific.

'A Naturalist in Cannibal Land.' By A. S. Meek. Edited by Frank Fox, with an introduction by the Hon. Walter Rothschild. London: T. Fisher Unwin. 1913. Pp. xiv., 231. *Illustrations, Map, Index. Price* 10*s.* 6*d.*

This is an excellent book of somewhat unusual type. The author, the son of a professional naturalist, while disclaiming scientific knowledge, makes it quite plain that he himself was born a naturalist—in the old-fashioned sense of the term—and, from his youth upwards, has loved all things of the open air. Under the auspices of his father, he began collecting as a boy in Hyde Park, the New Forest, and other familiar parts of the British Isles, and it was the hobbies thus formed which afterwards led him far afield—first to Queensland, where, even while still collecting, he trained himself for the adventure of his future life by working on a cattle ranch, a horse-breeding establishment, a sheep farm, and by long journeys "out-back"; and then, having thus proved his capacity, and having suitably and profitably placed at the Tring Museum the collections so far made, he passed on, under the auspices of the Hon. Walter Rothschild, to less-trodden and far more exciting collecting grounds in New Guinea and in the Solomon, Trobriand and Louisiade islands.

Mr. Rothschild writes that the new species of moths alone, collected by Meek, must be counted by the thousand, and adds—herein rightly appreciating the chief point in which Meek's work is of geographical interest—that "the zoogeographical results of his expeditions to these little-known places are naturally of great interest. New Guinea, the largest island of the globe, lying under the Equator, and its mountain ranges rising to such heights that they are covered with eternal snow, offers exceptional opportunities for the study of the vertical distribution of animals." No other Englishman, perhaps no foreigner, has brought together so much material for the study of the "zoogeography" of this remote and especially interesting tropical area; and it is from this point of view very satisfactory that the Meek collections have chiefly found shelter at the Tring Museum.

A perusal of the book will show that this worthy task of gathering material for students at home has been done under conditions exceptionally arduous; and for the less strenuous students among the Fellows of the Royal Geographical Society it may be noted, almost in the words of the editor, Mr. Frank Fox, that

to some it may appear that the chief value of this modestly told story of a naturalist's adventures in cannibal land lies in its human interest.

E. im T.

POLAR REGIONS.

Erichsen's Greenland Expedition.

'Report on the *Danmark* Expedition to the North-east coast of Greenland 1906–1908.' ('Danmark-Ekspeditionen til Grønlands Nordøstkyst 1906–1908.' Bind I. Ni. 1. From 'Meddelser om Grønland,' xli.) By G. Amdrup. *Portraits and Maps.* Pp. 270. Copenhagen: Bianco Luno. 1913.

Here, in an unpretentious paper-covered volume, is the detailed record of the extraordinary amount of work accomplished by Mylius Erichsen's expedition to Greenland. Though Mr. A. Friis, one of the artists of the expedition, published a popular account of it in Danish some years ago, no work in English on this fruitful expedition has hitherto appeared if we except a few lectures and articles by Lieut. Trolle, on whom the command devolved on Mylius Erichsen's death. In Denmark the survivors on their return were hailed with enthusiasm, and those who fell, Mylius Erichsen, Høeg Hagen and Jørgen Brønland, are held in honour, but in this country, despite our interest in polar exploration, the expedition attracted far too little notice. The splendid discoveries appear on the newer maps of Greenland, but their source is known to few and the stirring story of their attainment attracts little attention. The absence of an English version of the story no doubt partly accounts for this, but not altogether, for when Mikkelsen published the story of his search expedition in this country last year ('Lost in the Arctic') it aroused comparatively little enthusiasm, although it recorded one of the most marvellous sledge journeys on record around either pole. Be that as it may, however, this summary of the work of the *Danmark* expedition should prove most welcome. It is compiled by Lieut. Amdrup from diaries, records and personal information supplied by survivors. Lieut. Amdrup, though not a member of the expedition, is well qualified for the task from his own experience as an arctic explorer, and we are glad to see that the committee entrusted the work to a man with knowledge of the subject.

It is, perhaps, to be regretted that, as the report was writen before Einar Mikkelsen returned from Greenland in August, 1912, it takes no account of the later information obtained from Erichsen's missing records.* The author discusses at length the problem of Erichsen's return route, and decides against the likelihood of his having crossed the inland ice from Danmark fjord to Lambert's land. Mikkelsen proved that he had taken the coast route. The important discovery of the union of Peary land with the mainland of Greenland is of course not given here, since the discovery of the non-existence of Peary's Independence sound only came to light on Mikkelsen's return.

In this unemotional matter-of-fact record every journey is given in detail and a large-scale map of the discoveries is added, but it would have been an advantage had it borne indications of the routes of the main journeys. Facsimile reproductions of Lieut. Hagen's sketch-maps are also given. Apart from the detailed scientific researches carried out assiduously for two years, the main topographical results were splendid, and exceeded expectations. From about 75° N. to Cape Bismarck the rough survey of the German expedition of 1869–70 was amplified, and from Cape Bismarck to Navy Cliff and Cape Bridgman the map of the coast-line was linked with Peary's work, so that Denmark has now completed the charting of Greenland's coasts.

* A four-page leaflet since issued (as Bind I. Nr. 5) deals briefly with these records.

The book is a valuable one in all respects. It is to be followed by other volumes of scientific results, one of which has already appeared, and will be dealt with in a separate notice.

R. N. R. B.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Some Aspects of Physical Geography.

'The Atmosphere.' By A. J. Berry, M.A. Cambridge University Press. 1913. Pp. viii, 146. *Illustrations.* 1*s. net.*

'The Earth.' By J. H. Poynting, Sc.D., F.R.S. The same. Pp. viii., 142. *Diagrams.* 1*s. net.*

'The Age of the Earth.' By A. Holmes, B.Sc., London and New York: Harper & Brothers. 1913. Pp. xii., 196. *Illustrations and Sketch-maps.* 2*s.* 6*d. net.*

Two of these are volumes in the Cambridge Manuals of Science and Literature, and are worthy additions to this excellent series. In the first one the subject-matter is restricted to an account of the chemistry and physics of the constituents of the atmosphere, without reference to meteorology. Mr. Berry's method of treatment is a most interesting one, and topics of current research, such as the radioactivity of the atmosphere and the mechanism of the rusting of iron, are not neglected. In connection with the latter, apparently exigencies of the press have prevented more than a passing reference to the most recent work of Lambert, who has demonstrated in a convincing manner that electrical action is the first stage in the process of corrosion. The second of these volumes aims at explaining, without mathematical detail, how the shape and size of the Earth have been determined, how its mass has been measured, and how we know that it rotates uniformly. In this connection some accounts of the tides are given. Prof. Poynting has produced an admirable little book, and to compress so much into so small a space can have been no easy task. Both volumes are entirely free from the misleading half-truths so frequently found in popular accounts of scientific subjects.

The third volume is in Harper's Library of Living Thought, a series whose high standard it maintains. The various methods that have been applied to solve the problem of the Earth's age are carefully considered. Those based on the rate of cooling, the rate of denudation and of sedimentation, and on the accumulation of sodium are discussed in turn, and it is shown how each fails to solve the problem, generally owing to the doubtful applicability of the data that can be obtained. Lastly, the estimate based on radioactive disintegration is considered, and the author believes that on these lines of evidence we shall ultimately reach nearest to the solution of the vexed question. The volume contains a useful bibliography.

R. N. R. B.

Making and Use of Maps.

'Maps and Survey.' By Arthur R. Hinks. Pp. xvi. and 206. Cambridge: University Press. 1913. *Maps and Illustrations.* 6*s. net.*

A book from the pen of Mr. Hinks on the subject of maps and survey is certain of a warm welcome, firstly because the author is thoroughly master of his subject, and secondly because he has the valuable gift of clear exposition. Those who take up this book with the hopes of getting a lucid account both of the science of map-making and of the art of using a map when it is made will not be disappointed, and those students who are thinking of making a serious study of these sciences will find in this book an excellent introduction to the

subject. The author tells us that his experience of teaching the elements of geodesy and survey at Cambridge has shown him the need of a book giving in a simple, and as far as possible untechnical, form the elements of the many-sided art of survey. We are quite content to take his word for this; in fact, we might go further and state that the teaching of many subjects has suffered from the want of some simple introduction which shall tell the student what the subject means, what are its problems, and what are the general lines of their solutions. Think, for example, how a generation ago (to-day we understand matters are quite different) such a repulsive collection of apparently useless problems as the differential calculus was thrown at the head of the average boy without a hint as to what the whole thing meant. On the other hand, think what a stimulus to curiosity over a large range of knowledge such a book as Ganot's 'Physics' has been.

The main objects of a book such as that before us are therefore to whet curiosity and to rouse the imagination—curiosity carrying a desire for fuller knowledge, and imagination discerning the real spirit and meaning. In writing such a book the author must decide the point of the golden mean between too little and too much technicality, and, so far as we can judge, Mr. Hinks has held the balance with wisdom. While being in no sense a formal treatise on survey methods, it at the same time contains a succinct account of the principal operations that surveyors have to carry out.

If we were inclined to criticize we might perhaps say that the historical part of the subject is rather tersely and drily treated, while if it be objected that space was of consequence and that it was desirable that the book should not run to any great bulk, we might reply that some of the plates, *e.g.* X. with a picture of a planimeter while the theory of the instrument is not given, are really unnecessary. At the same time we note with pleasure that the plates have not been rigidly confined to pictures of the "useful" character. Plate XXI., "Measurement of the Lough Foyle Base," and others of the same class are rightly given a place in an introductory treatise. The book is a thoroughly good one, and, we venture to prophesy, will be studied with interest by a long series of pupils in survey work at the R.G.S. and elsewhere.

E. H. H.

GENERAL.

A Handbook of Geography.

'A Handbook of Geography.' By A. J. Herbertson, M.A., PH.D. Two vols. Edinburgh: Nelson & Sons. [1913.] *Maps and Diagrams.* 4*s*, 6*d*. each volume.

This handbook "has been written," to quote the preface, "to supply the long-felt want of a work intermediate between the ordinary elementary school geography and such a standard work of reference as Dr. H. R. Mill's 'International Geography.' It is designed for the use of students of training and technical colleges, and the highest classes of secondary and evening schools, the junior classes of Universities, and also for teachers"; and is "an attempt to treat the geography of the world as uniformly as the diversity of its conditions permits." In this the author has been decidedly successful. The first volume, of about 500 pages, is occupied with a general introduction, and the regional geography of European lands. Asia, Australia, Africa, and America are treated in the second volume in a compass of nearly 700 pages. Both are copiously illustrated with excellent maps and diagrams. These, in fact, are one of the best features in a most useful work, and one that certainly fills a gap among text-books. Specially full is the treatment of the physical features, and for this

purpose each continent is discussed as a whole. This method is no doubt the only correct one, as it permits the reader to obtain that general grasp of the physical framework of the subject which is too often lost in works which start rather from the political divisions. On the other hand, for political and economic questions the political divisions of the continents are, of course, employed so that matters which concern these units primarily as such find their fitting location in the work, in which a due sense of proportion is, on the whole, admirably maintained.

Prof. Herbertson explains that a considerable time has passed since the book was planned and begun, and this no doubt accounts for occasional statements not entirely in accord with existing conditions, although the text has been revised by a pupil of the writer's, Miss B. B. Rogers. The following suggestions are made, not so much as criticisms as in response to the author's request for notes of emendation and correction. The expression "three southern continents," used more than once, is surely not quite accurate; if a page or two cannot be spared for Antarctica, that continent should at least be mentioned. By an accident the Falkland islands have been omitted, though they deserve at least a brief notice, and a more adequate treatment of the Panama canal would no doubt be given in any subsequent edition. Doncaster cannot now be said to lie off the Yorkshire coalfield; nor can Montrose any longer be credited with considerable manufactures of flax and jute. While Dundee has practically abandoned the Arctic whaling, Leith is now engaged in whaling in the southern ocean. It was naturally impossible to supply an up-to-date account of the political geography of the Balkan peninsula, but it is a curious oversight to describe Portugal as a constitutional monarchy. In map 137 (Algeria) the Sud-Oranais railway is shown incorrectly as stopping at Ain Sefra. These, however, are small matters, and the book is an excellent one, for which Prof. Herbertson is to be thanked. The chapter on the United States of America is by Prof. R. E. Dodge of Columbia University.

Two Great Empires.

'Greater Rome and Greater Britain.' By Sir C. P. Lucas. Oxford: Clarendon Press. 1912. 3*s.* 6*d. net.*

The comparisons made in this work are of great geographical value. On p. 16 the author says, "What did not exist in the Roman Empire and what does exist in the British Empire is a steady stream of citizens going out from the homeland into what the Romans would have called the provinces, and there making their new homes on their own lines, scattered and isolated in great spaces. The element of space makes for diversity." Again, on p. 31, "The Romans ruled and left their mark upon a conquered world, just as we rule and are leaving our mark upon India. They gave organization, laws, institutions, language, roads, and buildings, but they did not give birth to and rear from subordination to equality young peoples of their own Roman race. So far as they colonized, they colonized, as has been seen, to a large extent in towns, and these towns had no separate political existence. They were little offshoots of Rome and garrisons of Romans; one and another had municipal privileges, but they were never intended to be, and never were, the beginnings of new peoples." These two extracts illustrate the problems of what the author terms space and youth in the growth of the British Empire. He goes on to discuss the influence of improved means of communication on distance, the connection of science and empire, and the questions of class, colour, and race.

'The Old Colonial System.' By G. L. Beer. (New York: Macmillan Co. 1912. Two vols, pp. xvi., 381; vii., 382.) "Above all else," says the author in his concluding paragraph, "the English Government sought effectively to establish the laws of trade and navigation and to create a self-sufficient commercial empire." The principles which govern the study of commercial geography have scarcely yet been applied to the past as they have to the present: when they are so applied, there will be material available as a groundwork in these two volumes. They deal, with constant reference to original authorities, with the period from 1660 to 1754; topographically, therefore, they are limited to the present eastern states of the Union, to the West Indies, on the one hand, and to Newfoundland on the other. But there is material and to spare to fill them even within this limited field, and the author uses it judiciously, and presents it very clearly.

'Submerged Forests.' By Clement Reid. (The Cambridge Manuals of Science and Literature.) (Cambridge: Univ. Press. 1913. Pp. 129. 1*s.*) It is one of the best attributes of the Cambridge Manuals, to which this volume belongs, that they present in an accessible and easily intelligible form certain subjects, or branches of knowledge and study, which the general reader might otherwise find it difficult to pursue. The present volume provides an obvious case in point. The subject is one of profound interest, especially as treated by Mr. Reid. The traveller has often seen for himself round our coasts the evidence of the former existence of forested land, but has probably been unable to explain it for himself, and has, likely enough, been misled by local tradition. He may be reminded that the question of the former land connection of these islands with the continent is involved; this is clearly treated in Mr. Reid's pages, and there is an interesting map.

'The Earth: its Genesis and Evolution.' By A. T. Swaine. (London: Griffin. 1913. Pp. xix., 277. *Illustrations.* 7*s.* 6*d.*) This work presents its thesis in an interesting manner, which, though not actually of a popular character, is sufficiently adapted to the needs of the general reader, which needs it has been one of the objects of the author to meet. At the outset the various theories of planetary genesis are dealt with, and the reader is then introduced to a survey, which occupies the major portion of the work, of the main geological epochs and their characteristic rocks. Chapters are devoted to the causes of climatic contrasts and of the "glacial episode." The writer touches but lightly on the subject of the figure of the Earth, and has designedly omitted any discussion of its age. Fair photographs show typical land-forms, and there are many excellent sections and other diagrams.

'Bradshaw's Through Routes to the Chief Cities and Bathing and Health Resorts of the World.' Edited by E. Reynolds Ball. (London: H. Blacklock & Co. 1913. Pp. lxviii., 707. *Maps and Plans.* 6*s. net.*) This, the fifty-second issue of Bradshaw's 'Through Routes,' while as handy and compact as its predecessors, has undergone very thorough revision. The information arranged, in the preceding edition, under fifty-two main routes, has now been conveniently distributed under seventy; the maps and plans, although slightly reduced in number by the inclusion only of capital cities, are adequate and up to date. The very ample descriptions of countries have been thoroughly revised and largely rewritten, while the appended bibliographies appear to include every new book of any importance.

'The *Times* Shipping Number.' (London: The *Times*, reprinted from the issue of December 13, 1912. Pp. 286, and advertisements. *Map.*) It is very well that this important publication has been made accessible in book form, even though the printing of the copy under notice does not always reach the high standard associated by custom with Printing House Square. Among much

matter with which geographers are not concerned it contains a considerable amount of material for economic geography which, in some instances, is not easily come by. In the articles on ports and docks, and especially those of the United Kingdom, there is much which concerns their various geographical relationships, the different conditions of which are made very clear. Elsewhere the notices on trade-routes may be referred to, and also the welcome authoritative (and not too florid) statement on the potentialities of the Panama canal, while the shipping interests of the more important foreign countries are dealt with in detail.

THE MONTHLY RECORD.

EUROPE.

The Ancient Outlet of the Po near Ravenna.—The intricate question of the interpretation of Pliny's statement regarding an ancient channel leading from the Po to Ravenna is once more discussed by Prof. D. Pantanelli in the *Bollettino* of the Italian Geographical Society for June last (Ser. V., vol. 2, No. 6). So far back as 1893 this writer had shown reason for doubting Cluverius' emendation of the passage in Pliny ("Angusta fossa [Padus] Ravennam trahitur ubi Padusa vocatur quondam Messanicus appellatus"), by which emendation the first word was replaced by Augusta, and the statement interpreted as meaning that the channel in question was an artificial one excavated by order of Augustus. This view has been generally accepted by modern commentators—without sufficient reason, according to Prof. Pantanelli, who in the above-mentioned paper adds to his former arguments for retaining the reading *angusta*, holding that the channel existed before the time of Augustus, and that, instead of being entirely artificial, it was merely an old natural mouth of the river cleared out in the interests of navigation.* He points to the geological evidence as proving that even in Quaternary times the shore-line near Ravenna ran further inland, and that the filling up of the basin by sediments was mainly the work of the Po, which must have once had its principal mouth south of the present delta. He refers to the difficulty of excavating a new channel through a region of marshes and lagoons, and says that no canals for navigation have been opened within historic times in the Emilian region that have not made use of pre-existing natural channels. The interpretation of Cluverius was by no means universally accepted by early Italian writers on the subject, and Prof. Pantanelli gives a useful summary of the opinions expressed by these, laying especial stress on the views of Corradi d'Austria, who in the eighteenth century contested the reading of Cluverius. Besides the main point at issue, there is some uncertainty as to the precise meaning of the passage in Pliny in other particulars, especially the sense to be attributed to *Padusa*, which occurs also in a fragment of Valgius, equally difficult of interpretation. Prof. Pantanelli discusses this and other questions in the course of his article. As regards the existence of a channel leading from the Po to Ravenna before the time of Augustus he has no direct evidence to offer, but he holds that any works for the amelioration of navigation are rather to be attributed to Pompey or Julius Cæsar than to Augustus, in view of the importance attached by the

* Bunbury, in the art. "Padus" in Smith's 'Dictionary of Greek and Roman Geography,' does not claim more than that the channel was "artificially regulated, and perhaps altered, by Augustus."

two former to Ravenna as a naval station of the first rank. He also points to the absence of the epithet "Divus" usually applied by Pliny and his contemporaries in speaking of Augustus.

Changes on the Coast of Languedoc and Catalonia.—An interesting study in comparative geography is made by Dr. J. Frank in *Petermanns Mitteilungen* for July last, on the basis of the 'Ora Maritima' of Avienus, itself based on Greek sources, probably of the nature of sailing directions, dating from the sixth century B.C. The article is an extract from a forthcoming memoir by Dr. Frank on the geography of the 'Ora Maritima,' which, judging from this instalment, should prove of much value, the conclusions of previous commentators having been too often vitiated by an insufficient acquaintance with the geographical factors involved. The larger part is devoted to the old writer's account of the neighbourhood of Narbonne, the main features of which are the description of two gulfs (*sinus*) running into the land, the one with three very large islands, the other, much indented, with four islands; the city of Narbo; the mouth of the Attagus (Aude); and a lake (*Helice palus*) situated near it. Dr. Frank attempts a reconstruction of the coast features at the time of the old description, which, while harmonizing with the facts or probabilities of geological history and present topography, appears to fit in well with the account given by Avienus. In particular, he lays stress on the distinction to be drawn between the words *sinus* and *palus*, a distinction not kept in view by previous writers. The former must be understood as an inlet open to the sea, the latter as a closed lake or lagoon. Again, while no doubt at the very beginning of the Quaternary period the sea ran far into the land up to the old steep coast-line, it must not be supposed that this was the case at the time in question, since there are distinct indications in the description that deposition had then progressed considerably both on the landward and seaward side, chiefly as a result of the great amount of sediment brought down by the Aude. Dr. Frank supposes the deltaic formation to have already divided the interior waters into two distinct inlets, the limits of which he shows on a copy of the French 1 : 80,000 map, the line of separation running south near Narbonne along the canal which represents the old main mouth of the Aude. Within the larger inlet east of this we find the three elevated areas constituting the islands of Clape, St. Martin, and Ste. Lucie, and though in the narrower inlet to the west and south there are more than four points that must formerly have been islands, there are just four which would be noticeable to those approaching from the sea. The *Helice palus* he finds, not as previous writers have done, in the Etang de Vendres, but further inland in the present relict-lake of Capestang, which palæontological evidence shows to have been already separated in late Quaternary time from the main bay into which the Aude debouched. Besides the sedimentation by the Aude and by the marine current from the direction of the Rhone, there is reason to suppose that the retreat of the sea is to be partly ascribed to elevation of the land. The second area dealt with (more briefly) is that of the Gulf of Rosas in northern Catalonia. Dr. Frank thinks that one large lagoon, the "Stagnum Toni" of Avienus, here stretched from the Estanque de Castellón to beyond the mouth of the Fluvia.

Exchange of Territory between Saxe-Weimar and Saxe-Meiningen.—The complicated nature of the territorial division of central Germany is well known, many of the smaller units having their territory split up into half a dozen different sections. Among other inconveniences this has had as a result that a single town or village may fall within two different jurisdictions. To remedy this state of things somewhat, an exchange of territory was effected

on January 1, 1913, between the Grand-Duchy of Saxe-Weimar and the Duchy of Saxe-Meiningen, the total areas ceded by each side to the other being practically identical. The principal localities concerned are in the neighbourhood of Kranichfeld and Pössneck, but one or two other small areas widely separated from the rest of the corresponding territory also change hands. The exchanges are clearly illustrated by a map in *Petermanns Mitteilungen* for July last.

ASIA.

The Turco-Persian Boundary Survey.—It is announced that the British party for the survey of this boundary (*Journal*, November, p. 492) will consist of Lieut.-Colonel C. H. Ryder, D.S.O., R.E., and Major H. Cowie, R.E., while Khan Bahadur Haji Abdul Rahim, of the Provincial Service, with three members of the Subordinate Service, will accompany the commission. Lieut. F. C. C. Yeats-Brown, 17th Cavalry, will command the escort, which will be formed by the 30th Indian Cavalry. An officer of the Indian Medical Service will probably be attached to the commission. The members will assemble at Muhammerah on December 15, and commence work early in January.

Mr. Rickmers' New Expedition in Central Asia.—Mr. W. R. Rickmers is leading a new expedition for mountaineering and geographical work in Eastern Bokhara under the auspices of the German and Austrian Alpine Club, in whose *Mitteilungen* (1913, Nos. 11, 14, 16) various reports of progress have already been printed. The party, which includes several scientists, left Munich on May 2, reaching Samarkand *viâ* Orenburg and Tashkent on May 13. Forming a caravan there, the travellers went south to Yakabagh, and crossed the Hissar range by the still snow-covered pass of Sangardak (11,150 feet) and the gorge of the river of the same name to Karatagh, ascending some fine peaks on the way. This route led through a district of great interest geologically. A stereographic survey of the Hissar range was carried out, and meteorological observations were made, those of radiation being particularly interesting. From Karatagh (left on June 21) the expedition went by Diushambe and over a low pass to the valley of the Vaksh or Surkhab, and up this to Kala-i-liabi-ob, two days' march above Garm, which served as the headquarters for the exploration of the Peter the Great range, the main task of the expedition. Before reaching the Vaksh the route led past the junction of the Alai and Peter the Great ranges, which (the former composed of crystalline rocks, the latter of quite recent formations) unite along the line of a great fault. Various excursions in the Peter the Great range were successfully accomplished, and a hitherto unknown pass, much used by the natives, leading from the valley of the Surkhab to that of the Khingob, was discovered. It is known as Childara, and has a height of about 11,480 feet. Various ascents were made, including that of the steep rock-peak of Sagunaki, supposed to be the highest summit of the range. An aneroid reading gave, for its extremely narrow summit ridge, a height of 5110 metres (16,765 feet), as against 5600 metres previously assigned to it, and it is not certain whether it or Sarikaudal, climbed by Mr. Rickmers on a former expedition, is the higher. The photogrammetric and theodolite survey was continued during these journeys, and a complete network of bearings extended over the greater part of the range. This forms geologically a vast system of folds—a number of parallel anticlines composed of Upper Cretaceous and Lower Tertiary rocks. The glacialogical observations throughout the journey showed that during the Ice age glaciation in this region was far more extensive than has been supposed, though recent glaciers have but a moderate extension in the Peter the Great

range (firn line about 12,600 feet, the glaciers ending at about 11,500). A map of this region was given in the *Journal* in 1907 (vol. **30**, p. 468).

The Tsangpo Expedition of Captains Bailey and Morshead.—According to a telegram from Calcutta on November 18, Captain F. M. Bailey of the Political Department and Captain Morshead of the Survey of India, to whose expedition reference was made in the last number of the *Journal*, have returned to India after successfully exploring the Tsangpo. Their journey had been an arduous one, but they had conclusively proved that the Tsangpo and Brahmaputra are one and the same river, as, indeed, had been previously known with practical certainty from indirect evidence. It is stated that they found the reported falls, which have been the subject of so much speculation, to be non-existent. Further details will be eagerly awaited.

Captains Pritchard and Waterfield on the Indian North-East Frontier.—On September 18 Captain Waterfield, of the 45th Sikhs, delivered a lecture at Simla on the explorations made by the late Captain Pritchard and himself in their journey to the Taron river, on the northern frontier of Burma (cf. *Journal*, vol. **42**, p. 207).* They left Sadiya on October 13 last year, passed the Brahmakund, and then crossed the watershed between the Lohit and the Irawadi by the Diphuk-la, 14,157 feet, above and close by the head of the Dichu. The Mijus, whose country the party passed through, were on the whole friendly, though the men were annoying at times. Their fighting value is *nil*, as there is no cohesion among the different clans. Their arms are a short *dah* and a cross-bow, the latter mainly for hunting musk-deer. The Mijus took the travellers as far as Kaha, at the junction of the Dichu and Lohit rivers, where they found the country occupied by Tibetan tribesmen, and were met by the officiating Jongpen of Yika, who was most polite, and presented a khatuk—the usual ceremonial scarf. The party then followed the road up the Dichu by an easy gradient to the foot of the Diphuk-la, where a steep ascent of 2000 feet led up to the pass. As their supplies were running short, the two officers journeyed down the valley on the far side to Kamti Long, where a base had been formed for them. In January, 1913, hey started on their second journey to the Taron valley, and many difficulties and hardships were encountered. The two explorers had to separate for a month, and the snowstorms proved unusually violent. On March 3 the combined parties started up the Taron from Saiyadam depôt, where they met Captain Moir, 26th Cavalry, one of the officers of the Kamti Long expedition, who frequently came to their rescue with food supplies. The river was found to run through a succession of immense gorges, and nearly all its affluents formed waterfalls. The track, which was very difficult, took the explorers up to 8000 feet, where snow was still lying a foot deep. The weather then improved, and Khan Mahomed, the surveyor, was able to put in some good work from a peak 2000 feet above the camp. A descent was made again to the river, and the Changtu country entered. The people met here were on an average only 4 feet 11 inches in height, and were probably of the same stock as those met in Menkong by Captain Bailey. At Pang difficulties arose with the villagers, who took down the only available

* It is now apparent that the Taron river in question is not the Taron of the Chindwin basin, but one or other of the headstreams of the main upper course of the Irawadi. This is marked as "Turong" or Kiu-kiang on Prince Henry of Orleans' map (*Journal*, vol. **8**, p. 656), whilst Captain Bailey (*Journal*, vol. **39**, p. 339 and map) makes the "Tarawan" a more western branch flowing to Kamti Long.

cane bridge to show their annoyance. A start was made to cross the uninhabited stretch of country between Nebli Taktai, the last Taron village, and Dokong on Captain Bailey's route, but the weather proved exceptionally bad, and it became doubtful whether Dokong still existed, as it was reported that the Chinese had burned all the villages on the Menkong-Rima road. On returning to Pang village, Captain Pritchard, with great energy, set to work to bridge the Taron, and it was whilst so engaged that he was washed away and drowned. Captain Waterfield paid an affectionate tribute to his memory, and said he was as fine a leader of an expedition as could be found anywhere. Unable to cross the Taron, Captain Waterfield took the party to Kamti Long in the hope of reaching Shirong, on the Lohit, where he had a base, but swollen rivers prevented his doing so, and he had therefore to return to Myitkyina.

AFRICA.

Soundings in Lake Tanganyika.—It has long been known that the great trench in which Tanganyika lies sinks to very great depths below the water-surface, though the actual soundings taken have been too few and wanting in precision to permit any definite knowledge of the form of the bed or maximum depths reached. Something has been done to supply the deficiency (according to a note in the *Zeitschrift* of the Berlin Geographical Society, 1913, No. 7) by Captain Jakobs, of the *Möwe*, during a six weeks' tour of the lake, undertaken primarily for practical ends connected with its navigation. The greatest depth found was 1277 metres, or 4188 feet (698 fathoms), which considerably exceeds the highest previous estimate. Dr. Livingstone ('Last Journals,' vol. 2, p. 19) recorded a depth of 326 fathoms (1956 feet), as given by a sounding opposite Mount Kabogo, and Giraud* one still greater, viz. 647 metres, or almost 354 fathoms (2129 feet), off Mount Mrumbi on the west coast; but there was, of course, no reason to suppose that no greater depths would be found. As pointed out in the *Zeitschrift*, the depth obtained by Captain Jakobs places the lake, according to the present state of knowledge, as the second deepest fresh-water lake in the world, Baikal coming first with 1523 metres (4995 feet, or 832 fathoms). As the level of the lake-surface, according to Dr. Kohlschütter, is probably about 2560 feet above the sea-level, the greatest depression of the bed yet known will reach a depth of 1628 feet below sea-level, making it one of deepest "crypto-depressions" yet brought to light. Captain Jakobs' examination has shown that exceedingly few dangers to navigation exist.

Bog-burst in Urundi, German East Africa.—The chief of the White Fathers labouring in Urundi, Pater van der Burgt, communicates to *Petermanns Mitteilungen* (July, 1913) an account sent to him by Pater Canonica of a remarkable phenomenon which occurred there in April last, viz. the sudden disappearance of one of the "mafunso" or papyrus swamps which form a common feature of that country. The swamp in question stretched from Mount Kamaramagambo to the Ruvuvu river, a distance of 25 to 30 miles, and the whole of the matted vegetation occupying the valley floor was swept away, leaving a sandy and pebbly bed traversed by a small stream with clear water. The natives were terrified, and the game which harboured in the swamp was either swept away or took refuge on the valley sides, where many were killed by hunters. Countless numbers of fish were left behind and secured by the natives, who also expected to raise a rich harvest of maize, sorghum, beans, etc., from the fertile soil of the valley. A similar event is said to have taken place forty years ago, and it is the belief of the people that this is the regular

* As quoted by Cornet, *Mouvement Géographique*, 1896, vol. 314.

period of recurrence. The sweeping away of the mass is thought to be due either to the abnormal rainfall of 1912, or to the sudden yielding of a natural dam by which the contents of the swamp were held up.

The Rainfall on Table Mountain.—Mr. Thomas Stewart, M.INST. C.E., has a short paper on this subject in the *Transactions of the Royal Society of South Africa*, vol. 3, part i., 1913. Observations were first commenced in January, 1881, and since then rain-gauges have been located at various spots on the mountain. At Waai Kopje, 3100 feet above sea-level, the difference between the average rainfall for the eleven years 1893–1903, and the thirty years 1893–1911 is only 1·20 inches—a trifling difference, the more interesting in that the first year of the eleven-year period was, with the exception of 1896, the driest year recorded on Table mountain since observations began, and the three following years, 1894, 1895, and 1896, were the three driest consecutive years, whilst the last year but one of the period (1902) was the wettest year ever recorded. The wettest station is at McLear's Beacon, 3586 feet, on the summit of the mountain. Regular records from this station were first obtained in 1893, and since that time the driest year was 1896 with a total of 73·4 inches, and the wettest 1902, with 126·18 inches. The wettest month recorded was August, 1899, when 36·58 inches fell. Mr. Stewart has himself been personally connected with the observing of rainfall on Table mountain, and in 1892, when investigating the question of the Cape Town water-supply, he decided to recommend the Town Council to provide additional gauges in view of the great differences of rainfall that appeared to exist on various parts of the mountain. These were supplied and placed at various points within the catchment area of 667 acres to the Cape Town reservoirs. The average monthly and annual rainfall values are given for the various stations at different levels on the mountain, in tables appended to Mr. Stewart's article.

AMERICA.

Isolated Ranges of the Paraguay Lowland.—Dr. Karl Carnier, who has spent some time in travel and researches in northern Paraguay, discusses the above subject in the *Mitteilungen* of the Munich Geographical Society, vol. 8, part i., 1913. The lowland in question lies between the tableland region of Brazil and the folded zone of the Andes, stretching eastward of the Paraguay river for an average distance of some 50 kilometres. In its northern part its uniformity is broken by isolated peaks and ridges, rising steeply from the plain and as suddenly disappearing again, though their similarity ends here, for they differ greatly in form, structure, and composition. While some, like the Pão d'Azucar (sugar-loaf), are formed of eruptive rock (augite-syenite), the greater part, especially towards the north, are of sedimentary origin. A noteworthy fact is that the Paraguay in more than one case breaks through the hard rocks of these elevations, although an easy way across the plain is open to it at no great distance. The river is not, however, antecedent to the mountains, nor is there evidence that it has removed a sedimentary covering which might have once masked the elevations. Tectonic dislocations, of which there are certain indications, seem rather to account for the facts observed. Besides their sudden emergence, the ranges are characterized in general by the disturbed position of the strata and their breaking up into fragments. The whole may be spoken of as a horst-like block-landscape. The writer lays stress on the parallelism between the western edge of the Brazilian tableland and the direction of the Andine chain, and thinks that there is a genetic relation between them. He regards the great lowland of the Paraguay as a region of depression intercalated between the ancient east and the younger west

of South America, and believes the mountains in question to be the remains of the sunken mass. A special feature of interest discussed by Dr. Carnier is the Gruta do Inferno, near Coimbra—a cavern hollowed, not out of the overlying limestone, but out of the underlying sandstone. In spite of this, it shows all the usual characters of limestone formation—stalactites, stalagmites, and other incrustations—for which the material has been supplied by percolation from the limestone.

The Buenos Aires—Asuncion Railways.—On October 20 the first international train left Buenos Aires for Asuncion, completing the journey of 946 miles in fifty hours. This marks the successful completion of a scheme planned twelve years ago for the opening of railway communication between the ocean and the capital of Paraguay, previously effected by river only. Even with the modern steamboats of the Argentine Navigation Company the voyage has taken from five to seven days upstream and three to five down, so that the saving of time is considerable, and Asuncion, rather than Buenos Aires, will in future be the starting-point for journeys into the interior of South America. This linking of Argentina with one of its commercial hinterlands has been made possible primarily by the establishment in 1908 of the train-ferry from Ibicuy port through 50 miles of tortuous channels within the Paraná delta to Zarate on the Santa Fé mainland, and the subsequent provision of a second, carrying the train some 4½ miles across the Alto Paraná between Corrientes and Paraguay. The combined railroads are now all of the standard 4 feet 8½ inches gauge, the lines of the Paraguay Central Railway having been specially altered for the purpose of through traffic. The part played by the river navigation will henceforth lose still more of its importance than at present, as was the case on the Mississippi after the introduction of railroads in the middle and western States.

AUSTRALASIA AND PACIFIC ISLANDS.

The Kaiserin-Augusta River Expedition, German New Guinea.—This important expedition has now been brought to a close, and most if not all of the members are on their way home. A brief summary of the results, which are valuable equally from the geographical as from the ethnological, zoological, and botanical points of view, is given in the *Deutsche Kolonialzeitung* for November 8, accompanied by a sketch-map of the new discoveries. Since the journeys described in our last notice (*Journal*, vol. 41, p. 390) the chief work accomplished by the geographer to the expedition, Dr. Behrmann, has lain in the region south of the lower course of the main river. Some account of this work is given in the *Zeitschrift* of the Berlin Geographical Society, 1913, No. 7. The exploration of the region mentioned was carried out in January, February, and March, 1913, and resulted in the discovery of an important southern tributary (named the Töpfer-Fluss), traversing a swampy tract between the Kaiserin-Augusta river and the next great stream to the east, the Ramu. Its upper course approaches to within 3 kilometres of the latter, the water-parting running not along a mountain range but through a swamp. A second large tributary, somewhat further west, was traced to its exit from the outliers of the central range, and various villages in this direction were visited for the first time. The latest account states that Dr. Behrmann has since made a journey from the upper course of the main river into the mountains known as the Western range, surveying the route as usual; while the ethnologist, Dr. Thurnwald, has crossed from the middle course of the river, through hitherto unknown ground, to the north coast. The collections made by the expedition have begun to arrive in Berlin, and are described as exceptionally extensive and valuable.

POLAR REGIONS.

Russian Arctic Expeditions.—News has at last been received from the Arctic expedition which set out under Captain Sedoff somewhat late in the summer of 1912, intending to make its way to or towards the Pole by the Franz Josef Land route. Rumours of disaster were current before the end of the year, but no definite news was obtainable. On October 2 last a telegram from St. Petersburg announced that the steamer *Olga* had picked up Captain Zacharoff and four sick sailors in Matushkin Shar, Novaya Zemlya, and learned that the expedition had passed the winter at the Pankratyeff islands (in 76° N.). When left by Zacharoff on August 11, Sedoff was intending to sail for Franz Josef Land at the end of the month. He has re-christened his vessel the *Suvorin*. Further particulars, given in the November number of *Petermanns Mitteilungen*, show that useful work was done during the winter and spring by expeditions in the little-known northern part of Novaya Zemlya, which will permit the construction of a new map of this portion. The health of the party had suffered considerably, and scurvy had broken out, which necessitated the return of Zacharoff and his companions. Captain Sedoff had asked for the despatch of a relief expedition, and his plea has been warmly supported by Dr. Nansen, who passed through St. Petersburg on his return from a voyage to the mouth of the Yenesei on board the steamer *Correct*, despatched last summer in the interests of commerce with Northern Siberia by the sea-route.* Two other Russian expeditions, those of Russanoff and Brussiloff, which also set out in 1912 (*Journal*, vol. 40, pp. 220, 646) are still in the field, and the absence of all news from them is causing uneasiness, especially as rumours of a wreck at the mouth of the Pechora have been current.

British Antarctic Expedition, 1914.—Mr. J. Foster Stackhouse is endeavouring to organize an expedition with the object of charting the coast of King Edward VII. Land. It is proposed to leave England in August, 1914, and, proceeding south by way of the Falkland islands, to enter the ice in about 70° S., 100° W. It is hoped that this position will be reached by the end of December, and the vessel will proceed as far south as possible while the summer lasts. If it be practicable to make the land, Mr. Stackhouse proposes to winter in some convenient harbour; otherwise it will be necessary to winter in the pack and proceed to the west during the following summer, before the end of which it is hoped that the homeward voyage will be begun. If necessary, however, Mr. Stackhouse proposes to spend a second winter in the ice, and do further work during the following summer. It is stated that a strong staff of scientists will be carried, and the vessel selected fully equipped for scientific research. The total cost of the expedition is estimated at £40,000.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Forests and Climate.—The complex question of the possible influence of forests on climate continues to be discussed, and whereas there was until lately a tendency on the part of scientific men to deny that any appreciable influence of the kind could be exercised, these are now signs of a disposition to treat the question more as an open one, though possibly not capable of solution with the

* The voyage was organized by a commercial company domiciled in Norway, whose director, Mr. J. L. Lied, himself took part in it. Tromsö was left on August 6 with a cargo of European goods, and the Yenesei reached on August 28. A cargo of Siberian produce was brought back, the return voyage occupying the time between September 10 and 20.

evidence yet available. Of recent contributions, one of the most useful is that of Prof. R. de C. Ward in the *Popular Science Monthly* for April last, in which that competent climatologist states the present position of the question in a generally fair and impartial spirit, though, as is only natural, he inclines perhaps to the side of caution in estimating the extent of any effect that may be traceable. While the popular interest in the subject centres mainly in the supposed influence of forests on *rainfall*, Prof. Ward gives due attention to all the varied climatic elements—wind strength, air and ground temperature, evaporation and humidity, radiation, etc.—on which forests may possibly exercise a modifying influence. In most of these cases he allows that a certain effect, though often an extremely small one, can be traced, one of the most important being the moderating effect of forests on temperature in the tropics, though that effect must be insignificant in the temperate zones. As regards humidity, too, weight is allowed to the effect of transpiration, which must supply a large amount of moisture to the air. Thus rain-bearing winds progressing inland from the ocean will continue rainy longer if they blow over extended forests than over bare ground. Prof. Ward discounts this, possibly somewhat unduly, by pointing out that the forests must have received the water before they can give it up, and he quotes with approval the statement of a recent German writer that a forest cannot increase the moisture content of the atmosphere as a whole. This may be true as regards the total amount discharged into the atmosphere within a given period, but surely there may be great differences in the extent to which that moisture is brought into useful circulation during the time that elapses before it is returned to its original source—the ocean. This part of the subject is dealt with by another writer, Dr. Raphael Zon of the United States Forest Service, who in *Science* of July 18 last supports the view that, in the special case of North America, the forests of the Atlantic plain do exercise an important influence on the humidity of the more inland parts of the continent. He holds that the part played by vapour from the ocean in the precipitation over land has been altogether exaggerated, quoting figures to show that the continental regions tributary to the oceans are capable of supplying seven-ninths of their precipitation by evaporation from their own areas. He also points out the immense importance of forest as an evaporator of water, and maintains that as the *prevailing* directions of the surface winds in the eastern half of the United States during the rainy period are from the Gulf of Mexico and adjoining ocean, a vast amount of moisture is carried by them from the forest region to the interior, which moisture, were that region bare of trees, would be quickly returned to the ocean by the surface run-off. His view, therefore, is that though forests may not affect the local climate to any great degree, they may have an important influence on that of a region lying to the leeward. In regard to rainfall, Prof. Ward takes a cautious view, holding that any increase caused by forests must be too small to be of practical importance. On the other hand, he allows that trees, by collecting and precipitating water-drops that would not otherwise reach the ground, may increase the total *fall* of rain in the actual area occupied by them.

HISTORICAL GEOGRAPHY.

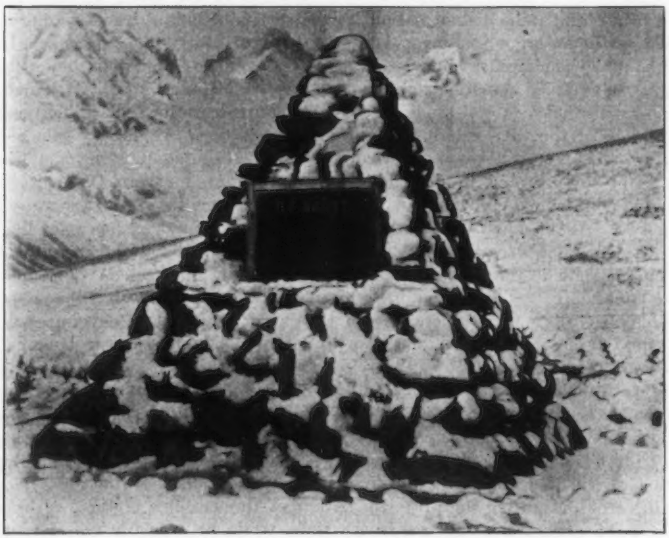
Early Intercourse by Sea between Abyssinia and China.—Among a series of papers connected with Chinese geography, published in the *Zeitschrift* of the Berlin Geographical Society in commemoration of the completion of Richthofen's monumental work, one by Dr. A. Herrmann on the above subject is of special interest as throwing new light on the early commerce of the East

at a period slightly before the beginning of our era—considerably earlier than the time dealt with by such authorities as the Periplus of the Erythræan sea and Claudius Ptolemy. The new information has lately been brought to light by Prof. Pelliot from the 'Annals of the Earlier Han Dynasty' (206 B.C.–24 A.D.), in chapter 28 of which are details on an apparently much used maritime route between China and a distant nation designated Huang-chi. A translation of the passages in question was given last year by Prof. Pelliot in *T'oung-pao*, but without the geographical elucidation necessary to make intelligible the (at first sight) enigmatical statements of the text. This is supplied by Dr. Herrmann, who shows that a careful study of the information permits a plausible reconstruction of the then existing commercial conditions. As already shown by Pelliot, the account is based on two distinct original sources differing somewhat in date, but agreeing in describing a seaway from Southern China to the kingdom of Huang-chi, though the intermediate stages are given differently in the two. At the date of the earlier source the chief commercial peoples likely to be concerned were those of the coasts of Farther India (and possibly the Sunda islands) in the east, and of Southern Arabia in the west. At the time of the later source the formation of Egypt into a Roman province and the appearance on the scene of the merchants of the Empire had given a new impetus to Eastern trade. The length of the voyage from Northern Anam to Huang-chi (ten to twelve months) shows that the latter cannot have been in any part of India; while the description of the people as on a low plane of culture puts out of court Egypt and the countries of the Persian gulf. The statement in another part of the Han annals, that a rhinoceros had been brought to China as tribute from Huang-chi, is thought by Dr. Hermann to point to the African coast of the Red sea as the terminus of the voyage, the horn of the *African* rhinoceros only being known to the author of the Periplus of the Erythræan sea as an article of commerce in his time, while he specially mentions the Axumitic Empire as its habitat. Dr. Herrmann's attempts to trace the origin of the name Huang-chi, and those of other points of call mentioned in the Han annals, may seem to some rather venturesome. He connects Huang-chi with the Geez or Agazi (Γάζη ἔθνος of the Adulis inscription), from which the speech of the old Axumites took its name. Of the intermediate localities, he suggests that Pi-tsung may represent the Besynga of Ptolemy (at the mouth of the Salwin; I-lu-mo, Sinhala or Ceylon; Shön-li and Fu-kan-tu-lu, places on the Malabar coast; and Tu-yüan, Katurgrama or Chittagong. The merchants who carried on the trade were probably the Sabæans of Southern Arabia, though quite possibly Abyssinian traders may also have taken part in the voyages.

GENERAL.

Memorials to Antarctic Heroes.—By the courtesy of Dr. Charcot we are enabled to give the accompanying illustration of the memorial to Captain Scott and his companions erected on the Col du Lautaret, French Alps, in the form of a cairn with suitable inscription on a bronze plate. The text of the inscription was given in the *Journal* for May of this year, p. 486. Various other tributes to the memory of the lost heroes are either contemplated or have already been brought to completion. On October 25 a bronze tablet in memory of Captain Oates was unveiled by Commander Evans in St. Anne's Church, Eastbourne, in which the deceased officer was accustomed to worship. A bronze portrait medallion of Captain Oates is to be executed by Lady Scott for Eton College, and will be placed in the Memorial Building. The suggestion of Admiral Moresby that the Navy should

provide a memorial to the same officer, in token of the appreciation of his heroism by the sister service, is being acted upon. It will take the form of a bronze statuette, to be executed by Mr. Charles L. Hartwell, which will be presented to the officer's mess of Captain Oates' regiment, the 6th Inniskilling



THE SCOTT MEMORIAL ON THE COL DU LAUTARET.

Dragoons. Lastly, a memorial of Captain Scott and his companions will, with the approval of the Admiralty, be erected in the chapel of the Royal Naval Barracks, Chatham, the cost being defrayed by subscription raised among the officers and men serving at the Chatham Naval Depôt and in the ships of the Nore command.

OBITUARY.

W. J. Ansorge.

We regret to record the death, which took place at St. Paul de Loanda on October 31, of Mr. W. J. Ansorge, well known for his work in Uganda in the early days of British rule in that country, described by him in his book 'Under the African Sun,' published in 1899. The son of a Bengal missionary of the Church Missionary Society, he was educated at Mauritius and at Cambridge, and from 1872 to 1886 held a Professorship at the Royal College, Mauritius. Subsequently qualifying for medical work, he was appointed District Medical Officer in Uganda, and in this capacity went through the troublous times of the Sudanese mutiny, receiving the medal and clasp for his services in its suppression. A keen naturalist, Ansorge made the best use of his opportunities for zoological work during his travels, and the book above referred to, besides describing his own experiences and the life of the people with whom he came in contact. contains much that is valuable in regard to the extensive collections made by

him, which included many species previously unknown to science. After leaving Uganda he crossed the continent to the West Coast and afterwards saw service in Nigeria, receiving the medal and clasp for his services on the Aro expedition (*Journal*, vol. **20**, p. 88). In 1881 he married the daughter of the late Dr. Ely.

Abbé Desgodins.

The veteran French missionary, M. Auguste Desgodins, well known to geographers during the latter half of last century for his labours on the (then) almost unknown borderlands of India, Tibet, and China, died at Padong (Phedong) near Darjiling on March 14 last, at the advanced age of 87. Ordained priest in 1850, he set out for the Tibet mission in 1855, being directed to attempt the route through India. The two adventurous pioneers of the same mission, Krick and Boury, had been murdered beyond the Eastern Asia border the year before, and Desgodins therefore tried to find a way first through Sikkim, afterwards by the Sutlej, but without success. During the Mutiny he was detained at Agra with the rest of the European garrison until relief came. Eventually he was ordered to proceed to China, but when on his way through the interior was imprisoned and sent back to Canton, but started again and finally reached the remote mission on the borders of Tibet in July, 1860. Here he laboured amid much opposition and discouragement for a number of years, making good use of his opportunities of collecting information on the geography, religion, etc., of the surrounding regions, and sending it home to the Paris Geographical Society, which voted him a medal in 1878. The collected accounts furnished by him were published in 1872 by his brother under the title 'La Mission du Thibet, de 1835 à 1870,' and a second edition, entirely recast, appeared in 1885 as 'Le Thibet, d'après la correspondance des Missionaires.' In 1880 Desgodins was instructed to return to India and renew the attempts from that quarter, and being well received by the British authorities, he founded the mission at Padong, in which the last years of his life were spent. Between 1890 and 1903, however, he had been engaged elsewhere in the publication of a Tibetan dictionary and grammar and other volumes intended for the use of the Tibetan converts. A sketch of the life of this devoted missionary, with portrait, appeared in the *Missions Catholiques* for May 23 last.

Eduard Pechuël-Loesche.

Eduard Pechuël-Loesche, for many years Professor of Geography at Erlangen, died on May 29 last, in his 73rd year. To geographers outside his own country he was perhaps best known for the part which he took in the German Loango Expedition of 1873–76—one of the first results of the renewed interest in Equatorial Africa as a field for research, which then and in subsequent years took so many German travellers to the coast and inland regions of West Africa. The results of this expedition were set forth in an extensive work of which the concluding volume appeared as recently as 1907. But Pechuël-Loesche's travels were almost world-wide, for in his young days he went to sea, and his voyages —many of them made in whalers and small sailing ships—gave him an extraordinarily varied experience. After a successful course of University study he again travelled extensively, and after the close of his African journeys he became Professor at Jena and afterwards at Erlangen, at the latter of which Universities he was the first to occupy the Chair of Geography. His influence as

a University teacher was of the most stimulating character. The above is in part based on an obituary notice contributed to *Petermanns Mitteilungen* (July, 1913) by his friend Prof. S. Günther.

CORRESPONDENCE.

Notes on Tides and the Effect they have on the Current on the East Coast of Africa, between Zanzibar Channel and Angoche.

After a few years' experience on the east coast of Africa as officer in the Union Castle Company, I have come to the conclusion that the tides have quite a marked influence on the current, especially in the vicinity of Mozambique and Angoche, where there are large bays, harbours, and rivers, and the rise and fall are several feet.

As we all know, the current strikes the coast somewhere in the vicinity of Cape Delgado, one part running north and the other south along the coast, its force varying from 1 to 4 knots per hour or thereabout.

In my opinion (and by facts which I will quote later, and on careful observations as to speed of ship, etc.) the flood tide sets with the current, that is north and south from Cape Delgado, and the ebb greatly checks the current, and in some places does away with it altogether. Several times on leaving Zanzibar (ebb tide) I have experienced no current for 50 or 60 miles south, and have had half a knot per hour with us.

As stated before, the tide has its greatest influence in the vicinity of Mozambique, which the following notes will prove:—

(1) October 28, 1912. On passage from Chinde to Mozambique. Average speed of ship from Chinde to Mafanudi island, off Angoche, was 11·3 knots per hour, ship being off Mafanude island at 2.30 p.m., high water Angoche 7.30 p.m. and 11 p.m. St. George island light off Mozambique was observed bearing N. 6° E. true, putting the ship close to the shoals, the ship having averaged 8·8 knots per hour from Mafanudi island, flood-tide for five hours after passing Angoche.

(2) July 9, 1913. On passage from Chinde to Mozambique at 6 p.m., in lat. 17° 42′ S., long. 48° 20′ E., to 7.30 a.m. on the 10th. When off Mafanude island the average speed of the ship was 9·6 knots per hour, it being high water at Angoche at 8.30 a.m on the 10th. The average speed of the ship from Mafanude island to Mozambique was 11·7 knots per hour, ebb tide after passing Angoche.

By the foregoing facts it will be seen that the ebb tide holds the southerly current in check, and from Cape Barracouta to Mozambique actually runs north, whilst the flood tide greatly strengthens the southerly current and practically doubles the force of it. These notes refer to 5 miles or so off the land. I don't think the tide has much influence when a ship is 10 miles or so off.

To my knowledge, several ships have been fooled in making Mozambique, either doing much more than they expected, or much less, and I am firmly convinced that it is the tidal influence on the current that is to blame.

The Position of Table Mountain north of Mozambique.

I think there is very little doubt that this mountain is considerably out of position to what it is on the Admiralty charts. The latitude seems fairly accurate, but the longitude some miles out.

I took careful bearings and angles when it bore west, and again when it bore nearly north when we were in Mozambique harbour, and I made it lie 2 to 3 miles E.S.E. of its charted position.

This mountain is very conspicuous, and, being fairly close to the coast, forms a good land-mark to ships.

A. C. H. Allanby,
(Extra Master), Officer Union Castle Mail S.S. Co.

[With reference to Mr. Allanby's letter, the Admiralty have practically no information on tidal streams in the locality mentioned by him, but the theory is probably correct. From Cape Delgado the tidal wave undoubtedly travels to the southward. Northward it is not so clear, as it seems to reach the coast everywhere south of Ras Hafun at much the same time. Commander C. V. Smith, of the Hydrographic Department, says that, speaking from memory, he does not recollect when surveying on this coast ever experiencing any tide outside the channels. Of course, between Chinde and Mozambique the current itself is very irregular.

As regards the last paragraph of the letter, information concerning Mount Meza is very meagre in the Hydrographic Department. Its position on Admiralty Chart No. 18,090, from Captain Owen's survey of 1824, and the two rays on chart No. 653 are from the same source. The only other information available on the subject is a Portuguese plan showing a reconnaissance of the bay and river Conducia, and hereon is stated that the south-western extreme of Mount Meza was determined to be in lat. 14° 45′ 10″ S., long. 40° 37′ 44″ E., Point Chiconia being in lat. 14° 45′ 10″ S., long. 40° 37′ 44″ E. This was determined on April 30, 1897. This information has, however, not been made use of, as this survey appears to have been a very incomplete one. It is not proposed to alter the position of Mount Meza on the Admiralty charts, as it cannot be assumed that it is relatively incorrect as regards other points in its vicinity.]

Early Voyages to the South Shetlands.

Gratefully acknowledging Dr. Mill's kind appreciation of my article on the South Shetlands, I have much pleasure in complying with his request for particulars of the sources from which I derived my information. The agreement between Captain Shirreff and Captain Smith is at the Public Record Office under the reference—Admiralty: Secretary: in letters, 2548. Captain Fildes's Journal is in the Manuscript Room of the British Museum under Pressmark 30170.F. 2, and I hope that I may be able to publish it shortly as Dr. Mill kindly suggests. Paragraphs in the *Courier*, London, June 19, 1821, *Sydney Gazette*, November 10, 1821, and journals (at the Record Office) of the King's ships in South American waters in 1819–20 have supplied me with additional facts about the South Shetlands.

When writing the paper I realized that the South Shetlands are not within the Antarctic Circle, but their discovery—establishing as it did such an important milestone on the road to the Pole—has led geographers to regard it as "the first absolutely clear episode in the history of Antarctic discovery since Cook." * Bransfield, for example, after exploring the South Shetlands, penetrated to as far as 65° S.

Dr. Mill thinks that Bellingshausen's expedition has priority of Bransfield's

* H. R. Mill, 'Siege of South Pole,' p. 93.

cruise as one fitted out with a special view to Antarctic exploration, and possibly he has had access to documents relating to the Russian voyage which I have not seen. I concluded that the *Williams* was the first ship to be fitted out *solely* for Antarctic discovery after I had compared the instructions issued to the two commanders. Those of Bellingshausen being in Russian, I cannot translate them, but I am told that in the history of the voyage the Russian Admiral states (p. 1, par. 2) that this Expedition "was appointed to examine those parts of the Southern ocean which had not yet been visited, as well as those already known, and also to examine the islands which previous navigators had not seen." We know that the expedition did go twice to Sydney and also visited Tahiti and other islands of the Pacific. It would thus seem that the voyage of the *Williams* has more right to be regarded as an expedition fitted out solely for Antarctic discovery than has that of Bellingshausen.

IDA LEE (Mrs. C. Bruce Marriott).

Mrs. Bruce Marriott's very interesting article in the October number of the *Geographical Journal* relating the agreement made by Captain Shirreff with Captain Smith, the discoverer of the South Shetlands, for four officers of the *Andromache* to be taken there to make a survey, has set me thinking. The agreement was that Captain Smith should take four officers and several blue-jackets on board his brig the *Williams of Blythe*, to proceed to the South Shetlands, make a survey, and return to Valparaiso. This was in December, 1819. The officers were Mr. Bransfield, the master of Captain Shirreff's ship the *Andromache*, Mr. Poynter, a master's mate, Mr. Bone and Mr. Blake, midshipmen. I was acquainted with Paddy Blake, who did good service in the first China war and was captain of the *Juno* in the Pacific, afterwards Admiral. The *Williams of Blythe* arrived at George's bay in the South Shetlands on January 16, 1820. The season was late, but the naval party surveyed all the islands Captain Smith had seen, and got as far as 63° S. The party returned to Valparaiso on May 27.

John Markham, Sir Albert Markham's father, was also a midshipman and acting lieutenant on board the *Andromache*. Although he did not go in the *Williams of Blythe*, he made a careful copy of Mr. Bransfield's chart, which is now before me, when his shipmates returned. Clarence island is shown, then the land, now known as Elephant island, which was supposed to be continuous to the south; then Bridgeman island, George bay, and two other islands to the west; Trinity Land in 63° 45′ S. There are 21 names on the chart. Variation 24·49 E. in 62° W. and 19° 63′ E. in 53° W. Mr. Bransfield's conception seems to have been that there was continental land forming a great bay ending with Elephant island to the east and Shirreff's cape to the west. The islands, with George bay, are across the mouth of the bay. This great supposed bay is now Bransfield strait.

CLEMENTS R. MARKHAM.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1913–1914.

First Meeting, November 10, 1913.—The Right Hon. Earl CURZON OF KEDLESTON, G.C.S.I., G.C.I.E., etc., President, in the Chair.

ELECTIONS.—*Mrs. Alec-Tweedie; Frank Herbert Barley; Hon. Charles Bill; Mrs. E. Bill; Rev. Oswald William Charles Blogg; Captain Victor Campbell,*

R.N.; Orme B. Clarke, B.A.; W. Fanshaw, B.A.; Basil John Gould; George Jackson Graham; Miss Lavinia Mary Hardy; Edward Branson Harris; Collingwood Hope, K.C.; Michael Isaacs; Miss Elizabeth Kimball-Kendall; Mrs. Sidney Lacon; Captain Hubert Lynes, R.N.; Miss Marianne Harriet Mason; Ross St. John McClelland; Henry Obre; Lieut. G. T. C. Perram, R.A.; Miss Elizabeth Mary Waters; Walter S. Wheeler; Apsley Brooke Winch.

The paper read was:—

"The Work and Adventures of the Northern Party of Captain Scott's Antarctic Expedition 1910–13." By Raymond E. Priestley.

For presentation of Antarctic Medals, see p. 550.

Afternoon Meeting, November 20, 1913.—Colonel Sir T. H. HOLDICH, K.C.M.G., K.C.I.E, Vice-President, in the Chair.

The paper read was:—

"Relief in Cartography." By Captain H. G. Lyons, F.R.S.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
Jber. = Jahresbericht.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidakrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Austria—Bohemia. *Sborník České Společnosti Zeměvědné* 19 (1913): 1–18. **Danes.**
Morfologický vývoj střednich Čech. Napsal Dr. J. V. Daneš.

Balkan peninsula. *B. American G.S.* 45 (1913): 576–584. **Dominian.**
The Balkan peninsula. By Leon Dominian. *Sketch-map and Illustrations.*

Carpathians. **Lomnicki.**
Sprawozdanie Komisyi Fizyograficznej (Cracow) **45** (1911): Sect. iv., 8–17.
O skladnikach tektonicznych Podkarpacia nadwórniansko-solotwinskiego. Napisal Jaroslaw Lomnicki. *Sections.*
On the structure of a portion of the southern Carpathians.

Crete. *Rep. British Ass., Dundee*, 1912 (1913): 224–268. **Myres.**
Archæological and Ethnological Researches in Crete. (Report of Committee, by Prof. J. L. Myres, secretary.)

Crete—Archæology. *Univ. Pennsylvania Anthrop. Publ.* **3** (1912): 43–74. **Hall.**
Excavations in Eastern Crete: Sphoungaras. By Edith H. Hall. *Sketch-map, Section, and Illustrations.*

Europe. **Lyde.**
The continent of Europe. By Lionel W. Lyde. London: Macmillan & Co., 1913. Size 9 × 5½, pp. xv. and 446. *Maps, Plans, and Diagrams. Price 7s. 6d. net. Presented by the Publishers.*

Europe—Archæology. **Kossinna.**
Der Germanische Goldreichtum in der Bronzezeit. Von Prof. Dr. Gustav Kossinna. I.: Der Goldfund von Messingwerk bei Eberswalde und die goldenen Kultgefässe der Germanen. (Mannus-Bibliothek, herausgegeben von Prof. Dr. Gustav Kossinna. No. 12.) Würzburg: C. Kalitzsch, 1912. Size 10½ × 7, pp. ix. and 55. *Sketch-map and Illustrations. Price M.5. Presented by the Publisher.*

Faeroes. *Z. Ges. E. Berlin* (1913): 161–193, 273–298. **Rudolphi.**
Die Färöer. Von Hans Rudolphi. *Illustrations.*

France—Cantal. *B.S.G. Com. Havre* **29** (1912): 126–142. **Bourgeois.**
Le Cantal. Par A. Bourgeois.

France—Gironde—Climate. *Rev. G. Com., S.G. Bordeaux* (1912): 337–356. **Hautreux.**
Influence de l'Océan sur le Climat de la Gironde. Par A. Hautreux. *Sketch-map and Diagrams.*

France—Minerals. *La G., B.S.G. Paris* **28** (1913): 27–34. **Lemoine.**
Les minerais de Normandie et de Bretagne. Par Paul Lemoine. *Sketch-map.*

France—Nord. *B.S.G. Lille* **59** (1913): 80–103, 170–187, 228–242. **Lefebvre.**
La vie rurale en Pévèle. Par Théodore Lefebvre. *Sketch-maps and Illustrations.*

France, Northern—Commerce. *Ann. G.* **22** (1913): 227–244. **Demangeon.**
Les relations de la France du nord avec l'Amérique. Par A. Demangeon.

France—Savoy. *La G., B.S.G. Paris* **27** (1913): 349–357. **Rabot.**
La vie pastorale dans la Savoie septentrionale. Par Charles Rabot. *Diagram.*
Based on recent studies by M. Arbos (cf. *Journal*, vol. 41, p. 64).

France—Seine Valley—Hydrology. **Dollfus.**
C.R.A. Sc. Paris **156** (1913): 1032–1034.
Efficacité des puits absorbants. Par Gustave F. Dollfus.
On attempts to carry off floods by such wells.

France—Seismology. *La G., B.S.G. Paris* **27** (1913): 284–288. **Rabot.**
La séismicité dans le bassin de Paris. Par Charles Rabot. *Sketch-maps.*

France—South-West Coast. **Saint-Jours.**
Rev. G.Com., S.G. Bordeaux (1912): 377–390, 413–426.
La carte géologique de Lesparre et la côte landaise. Par B. Saint-Jours. *Sketch-map and Section.*

Germany—Coast. *Z. Ges. E. Berlin* (1912): 527–532. **Spethmann.**
Zur Deutschen Landeskunde. II. Küstenverlagerung und Meeresströmung zwischen Rügen und Alsen. Von Hans Spethmann.

Germany—Helgoland. **Lindemann.**
Das deutsche Helgoland. Von Dr. E. Lindemann. Charlottenburg (Berlin): Vita, [1913]. Size 10 × 7½, pp. xv. and 271. *Maps and Illustrations. Price 6s. 5d.*

Germany—Pomerania—Coast. **Otto**

Der Darss und Zingst. Ein Beitrag zur Entwicklungsgeschichte der vorpommerschen Küste. Von Dr. Theodor Otto. (Sonderabdruck aus dem xiii. Jahresbericht der Geographischen Gesellschaft Greifswald, 1911–12.) Greifswald, 1913. Size 9 × 5½, pp. 235–485. *Maps and Illustrations.*

Germany—Schwarzwald. **Schmitthenner.**

Die Oberflachengestaltung des nördlichen Schwarzwalds. Von Dr. Heinrich Schmitthenner. (Abhandlungen zur badischen Landeskunde, herausgegeben von L. Neumann und A. Hettner, 2. Heft.) Karlsruhe: G. Braun, 1913. Size 9½ × 6½, pp. vii. and 109. *Sketch-map, Sections, and Diagrams. Price M.3. Presented by the Publisher.*

Greece—Corfu. *Deutsche Rundschau G.* **35** (1913): 198–207, 251–259. **Mielert.**

Charakterbilder aus Korfu. Von Fritz Mielert. *Illustrations.*

Greece—Monasteries. *B.G.S. Philadelphia* **11** (1913): 133–169. **Hyde.**

The monasteries of Meteora and Greek monasticism. By Dr. Walter Woodburn Hyde. *Illustrations.*

Greece—Monasteries. *P.S. Biblical Archæology* **35** (1913): 141–149. **Hall.**

Some Greek Monasteries. By H. R. Hall. *Illustrations.*

Greece—Nomenclature. *Deutsche Rundschau G.* **35** (1913): 265–272. **Täuber.**

Topographische Namen in Griechenland. Von Dr. C. Täuber.

Iceland. *G. Ts., K. Danske G.S.* **22** (1913): 4–13. **Bruun.**

Islænderfærder til Hest over Vatna-Jokull i ældre Tider. Ved Kapt. Daniel Bruun. *Sketch-map and Illustrations.*

Iceland. *G. Ts., K. Danske G.S.* **21** (1912): 233–238. **Erkes.**

Fra Islands Indre: Rejseskitser. Af Heinrich Erkes. *Illustrations.*

Iceland. *G. Ts., K. Danske G.S.* **21** (1912): 257–264. **Koch.**

Den Danske Ekspedition til Dronning Louises Land og tværsover Nordgrønlands Inlandsis 1912–1913, under Ledelse af Kapt. J. P. Koch. *Map and Illustrations.*

This report describes a journey across the Vatna Jökull.

Iceland. **Spethmann.**

Islands grösster Vulkan: die Dyngjufjöll mit der Askja. Von Dr. Hans Spethmann. Leipzig: Veit & Co., 1913. Size 9½ × 6½, pp. viii. and 163. *Sketch-map and Illustrations. Price M.6. Presented by the Publishers.*

Iceland—Fisheries. **Sæmundsson.**

Skrifter Kom. Havundersøgelser (Danmark), No. 5 (1909): pp. 140.

Oversigt over Islands Fiske, med Oplysninger om deres Forekomst vigtigste biologiske Forhold og økonomiske Betydning. Af Bjarni Sæmundsson. *Map.*

Italy—Alps—Gran Paradiso. *Riv. G. Italiana* **20** (1913): 81–91. **Monti.**

Sul limite del bosco al Gran Paradiso. Per V. Monti.

Italy—Campagna. *Quarterly Rev.* **218** (1913): 330–352. **Ashby.**

The Alban Hills. By Thomas Ashby. *Sketch-map and Illustrations.*

Italy—Cartography. *La G., I.G. De Agostini* **1** (1913): 281–288. **Porro.**

La revisione toponomastica della Carta topografica d'Italia alla scala di 1 : 100,000. Di Carlo Porro.

Italy—Census. **Magistris.**

L. F. de Magistris. Intorno ai risultati definitivi del V. Censimento Generale della popolazione del Regno d'Italia (10–11 giugno 1911). Novara, 1913. Size 9½ × 6½, pp. 54.

Italy—Rainfall. *Riv. G. Italiana* **20** (1913): 92–98. **Anfossi.**

La distribuzione stagionale delle pioggie nell' Italia Settentrionale. Per G. Anfossi. *Sketch-map and Illustrations.*

Italy—Umbria. **Cameron.**

Umbria past and present. By Mary Lovett Cameron. London: Sidgwick & Jackson, [1913]. Size 7½ × 5, pp. xx. and 324. *Illustrations. Price 6s. net. Presented by the Publishers.*

Luxemburg. **Renwick.**

Luxembourg: the Grand Duchy and its people. By George Renwick. London:

T. Fisher Unwin, 1913. Size 9 × 6, pp. 320. *Sketch-map and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publisher.*

Montenegro. *Deutsche Rundschau G.* **35** (1913): 315–320, 337–352. **Přerovsky**

Eine Fahrt durch das südwestliche Montenegro 1912. Von Prof. Richard Přerovsky. *Illustrations.*

United Kingdom—Coalfield. **Gibson.**

Memoirs of the Geological Survey. England and Wales. The concealed coalfield of Yorkshire and Nottinghamshire. By Dr. Walcot Gibson. London, 1913. Size 9½ × 6, pp. vi. and 122. *Sketch-map, Diagrams, and Sections. Price* 1*s.* 6*d.*

United Kingdom—Devon—Torbay. **Jukes-Browne.**

The making of Torbay. By A. J. Jukes-Browne. (Reprinted from the *Transactions* of the Devonshire Association for the Advancement of Science, etc., 1912, vol. 44.) [Torquay, 1912.] Size 8½ × 5½, pp. 14. *Sketch-map.*

United Kingdom—Ecology. **Crampton.**

Ecology: the best method of studying the distribution of species in Great Britain. By C. B. Crampton. (Reprint from the *Proceedings* of the Royal Physical Society of Edinburgh, Session 1912–1913, vol. **19**, No. 2.) Edinburgh, 1913. Size 10 × 7, pp. 22–36.

United Kingdom—England. **MacMunn.**

The Oxford Geographies; edited A. J. Herbertson. The upper Thames country and the Severn-Avon plain. By N. E. MacMunn. Oxford: Clarendon Press, 1913. Size 7½ × 5, pp. 124. *Sketch-maps and Illustrations. Price* 1*s.* 8*d. Presented by the Publishers.*

United Kingdom—England—Geology. **Ussher and Barrow.**

Memoirs of the Geological Survey, England and Wales. Explanation of sheet 349. The geology of the country around Ivybridge and Modbury. By W. A. E. Ussher, with chapter on altered rocks by G. Barrow. London, 1912. Size 9½ × 6, pp. vi. and 138. *Illustrations and Sections. Price* 3*s.*

United Kingdom—Historical—Coast Defence. **Haverfield.**

J. Roman Studies **2** (1912): 201–214.

Notes on the Roman coast defences of Britain, especially in Yorkshire. By Prof. F. Haverfield. *Sketch-map, Plan, Section, and Illustrations.*

United Kingdom—Ireland—Census. **Thompson.**

J.R. Statistical S. **76** (1913): 635–671.

The Census of Ireland, 1911. By Sir William J. Thompson.

United Kingdom—Population. *J.R. Statistical S.* **76** (1913): 261–303. **Gonner.**

The population of England in the eighteenth century. By Prof. Edward C. K. Gonner. *Sketch-maps.*

United Kingdom—Population. *J.R. Statistical S.* **76** (1913): 304–317. **Welton.**

Note on urban and rural variations according to the English census of 1911. By Thomas A. Welton.

United Kingdom—Scotland. **Kermack.**

Historical geography of Scotland. By W. R. Kermack. Edinburgh, etc.: W. & A. K. Johnston, 1913. Size 7½ × 5, pp. vii. and 134. *Sketch-maps. Price* 2*s.* 6*d. net. Presented by the Publishers.*

United Kingdom—Scotland—Canal. ———

Mid-Scotland Ship Canal National Association. (Between the Atlantic and North Sea.) Forth and Clyde *viâ* Loch Lomond. Founded in 1909 by the late Admiral Sir Charles Campbell. 2nd edit. (Edinburgh, 1913.) Size 20 × 12½, pp. 4. *Sketch-map and Plans.*

United Kingdom—Scotland—Geology. **Barrow and others.**

Memoirs of the Geological Survey, Scotland. The geology of Upper Strathspey. Gaick, and the forest of Atholl. (Explanation of sheet 64.) By George Barrow, Lionel W. Hinxman, and E. H. C. Craig, with contributions by H. Kynaston. Edinburgh, 1913. Size 9½ × 6, pp. vi. and 116. *Sketch-map, Illustrations, and Section. Price* 2*s.*

United Kingdom—Scotland—Kames. **Gregory.**

T. Geol. S. Glasgow **14** (1911–12): 199–219.

The Polmont Kame, and on the classification of Scottish Kames. By Dr. J. W. Gregory. *Sketch-maps and Sections. Also separate copy.* Size 8½ × 5½.

United Kingdom—Yorkshire. **Goodall.**

Place-names of South-West Yorkshire; that is, of so much of the West Riding as lies south of the Aire from Keighley onwards. By Armitage Goodall. Cambridge: University Press, 1913. Size 8½ × 5½, pp. vii. and 314. *Price 7s. 6d. net. Presented by the Publishers.*

ASIA.

Arabia. **Raunkiær.**

Barclay Raunkiær. Gennem Wahhabiternes Land paa Kamelryg: Beretning om den af det K. Danske Geografiske Selskab planlagte og bekostede Forskningsrejse i Øst- og Centralarabien, 1912. Copenhagen: Glydendal, 1913. Size 9 × 6, pp. 304. *Map and Illustrations. Presented by the Author.*

Arabia. *G. Ts., K. Danske G.S.* **21** (1912): 283–289. **Raunkiær.**

Beretning om min Rejse i Central-Arabien. Af Barclay Raunkiær. *Sketch-map and Illustrations.*

See note in vol. **40**, p. 331.

Arabia—Oman. **Omar.**

Minist. Affari Esteri, Monogr. e Rapp. Col., 1912, No. 10: pp. 39.

Il Sultanato di Oman. Di Umberto Omar.

Central Asia. **Carruthers.**

Unknown Mongolia: a record of travel and exploration in North-West Mongolia and Dzungaria. By Douglas Carruthers. 2 vols. London: Hutchinson & Co., 1913. Size 9½ × 6½, pp. xviii., x., and 659. *Maps and Illustrations. Price 28s. net. Two copies, presented by the Author and Publishers.*

Central Asia—Altai. *Annuaire géol. et min. Russie* **14** (1912): 262–269. **Obrucheff.**

Geologische Untersuchungen im Kalbinskischen Gebirge (Westl. Altai) im Jahre 1911. Von Prof. W. A. Obrutschew. *Sketch-map.*

China. **Bland and Backhouse.**

China under the Empress Dowager; being the history of the life and times of Tzŭ Hsi, compiled from State Papers and the private diary of the Comptroller of the Household. By J. O. P. Bland and E. Backhouse. London: W. Heinemann, 1912. Size 10½ × 6½, pp. xxvi. and 525. *Illustrated. Price 16s. net.*

China—Chekiang. **Pape.**

Alluvial Chekiang. By C. Pape. Wei-hsien, 1913. Size 8 × 5½, pp. 20. *Sketch-maps and Illustrations.*

China—Language. **Hirtzel.**

La Facilité de la langue Chinoise. Etude de la langue chinoise orale et écrite. Par J. S. Harry Hirtzel. Ciney: L. Judou, [1913]. Size 10 × 6½, pp. 40.

China—Name. *T'oung Pao.* **13** (1912): 719–726. **Laufer.**

The name China. By Berthold Laufer.

China—Name. *T'oung Pao.* **13** (1912): 727–742. **Pelliot.**

L'origine du nom de "Chine." Par Paul Pelliot.

See note on these two papers in the September number, p. 294.

Chinese Turkestan—Archæology. **Chavannes.**

Les documents chinois découverts par Aurel Stein dans les sables du Turkestan Oriental. Publiés et traduits par Edouard Chavannes. Oxford: University Press, 1913. Size 13 × 10, pp. xxiii. and 232. *Facsimiles. Price £3 3s. Presented by the Publishers.*

Eastern Asia—Forests. **Hofmann.**

Aus den Waldungen des fernen Ostens: forstliche Reisen und Studien in Japan, Formosa, Korea, und den angrenzenden Gebieten Ostasiens. Von Dr. Amerigo Hofmann. Vienna: W. Frick, 1913. Size 9½ × 6, pp. viii. and 225. *Maps, Illustrations, and Diagrams.* [illegible] 10*s.* 10*d.*

India—Assam. *Records Geol. Surv. India* **42** (1912): 254–264. **Pascoe.**

A Traverse across the Naga Hills of Assam from Dimapur to the neighbourhood of Sarameti Peak. By E. H. Pascoe. *Maps and Illustrations.*

India—Cochin—Ethnology. **Iyer.**

The Cochin tribes and castes. Vol. 2. By L. K. Anantha Krishna Iyer.

Madras: Higginbotham & Co., 1912. Size 10 × 6½, pp. xxiii. and 504. *Illustrations. Presented by the Publishers.*

India—Geology. **Hayden.**

Notes on the relationship of the Himalaya to the Indo-Gangetic Plain and the Indian Peninsula. By H. H. Hayden. (From the *Records*, Geological Survey of India, vol. 43, part 2, 1913.) Calcutta, 1913. Size 10½ × 7, pp. 138–167. *Sketch-map and Illustrations.*

India—Kashmir. **Neve.**

Thirty years in Kashmir. By Arthur Neve. London: E. Arnold, 1913. Size 9 × 5½, pp. viii. and 316. *Map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publisher.*

India—North-East Frontier—Geology. **Brown.**

Records Geol. Surv. India 42 (1912): 231–253.

A geological reconnaissance through the Dihong Valley, being the geological results of the Abor Expedition, 1911–12. By J. Coggin Brown. *Sketch-map.*

India—Sikkim—Phytogeography. **Smith.**

Records Botanical Surv. India 4 (1913): 323–431.

The Alpine and Sub-Alpine vegetation of South-East Sikkim. By W. W. Smith.

India and Ceylon. **Murray.**

A handbook for travellers in India, Burma, and Ceylon . . . 9th edit. London: John Murray, 1913. Size 7½ × 5, pp. clxviii. and 664. *Maps and Plans. Price* 20*s. Presented by the Publisher.*

Indo-China—Historical. *B. l'École Française d'Extrême-Orient* 12 (1912): 1–4. **Finot.**

Les origines de la colonisation indienne en Indochine. Par Louis Finot.

Japan. **Mitford.**

Japan's inheritance; the country, its people and their destiny. By E. Bruce Mitford. London: T. Fisher Unwin, 1913. Size 9 × 5½, pp. 384. *Maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publisher.*

Malay Archipelago—Celebes. **Ahlburg.**

Versuch einer geologischen Darstellung der Insel Celebes. Von Johannes Ahlburg. (Geologische und Palæontologische Abhandlungen, N. F., Bd. 12, Heft 1.) Jena: G. Fischer, 1913. Size 12 × 9½, pp. 172. *Maps, Illustrations, and Sections. Price* 42*s.*

Russia—Siberia. **Wright and Digby.**

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Bolivia—Languages. **Créqui-Montfort and Rivet.**
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On the conditions rendering such a railway necessary, and the history and nature of the undertaking.

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Guatemala and the States of Central America. By Charles W. Domville-Fife. London: F. Griffiths, 1913. Size 9 × 5½, pp. 310. *Sketch-map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publishers.*

Panama Canal. **Bishop.**

The Panama gateway. By Joseph Bucklin Bishop. London: T. Fisher Unwin, 1913. Size 9 × 6, pp. xvi. and 459. *Map, Illustrations, and Facsimile-plans. Price* 10*s.* 6*d. net.*

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See note in vol. 41, p. 591.

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On some Ordovician fossils from Boothia Felix and King William Land collected during the Norwegian expedition of the *Gjöa*, Captain Amundsen, through the North-West Passage. By Olaf Holtedahl. *Sketch-map and Illustrations.*

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Climatology. *National G. Mag.* **24** (1913): 181–198. **Abbot.**

Do volcanic explosions affect our climate? By C. G. Abbot. *Diagram and Illustrations.*

Cf. note in the July number, p. 83.

Erosion. *C.R.A. Sc. Paris* **156** (1913): 582–584. **Lugeon.**

Sur un nouveau mode d'érosion fluviale. Par Maurice Lugeon.

On rectilinear, as opposed to whirlpool action of running water.

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The nature and origin of fiords. By Dr. J. W. Gregory. London: John Murray, 1913. Size 9 × 5½, pp. xvi. and 542. *Sketch-maps, Sections, and Illustrations. Price* 16*s. net. Presented by the Publisher.*

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The sling: letters to the Royal Institution, the Institution of Civil Engineers, and the Admiralty, May, 1905, to May, 1912. By Wm. Leighton Jordan. 2nd edit. London: Simpkin, Marshall & Co., [1913]. Size 9 × 6, pp. vii. and 431. *Portraits and Diagrams. Price* 7*s.* 6*d. net. Presented by the Author.*

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The significance of early and of pleistocene glaciations. By Dr. Marsden Manson. (Extrait du *Compte Rendu* du XI^e^ Congrès Géologique International.) Stockholm, 1912. Size 9½ × 6½, pp. 1089–1106. *Diagram.*

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The effect upon atmospheric transparency of the eruption of Katmai volcano. By Prof. Herbert H. Kimball. *Sketch-map.*

Evidence of marked diminution of transparency in the United States in the middle and latter part of 1912 (cf. July number, p. 83).

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Commercial—Coal. **McInnes and others.**

The coal resources of the world: an inquiry made upon the initiative of the Executive Committee of the XII. International Geogical Congress, Canada, 1913. Edited by William McInnes, D. B. Dowling, and W. W. Leach. 3 vols. Toronto: Morang & Co., 1913. Size 11½ × 8½. *Maps and Diagrams; also separate Atlas of Maps and Sections. Price* 108*s.*

Communications—German cables. *Deutsche Erde* **11** (1912): 145–150. **Roscher.**

Deutsche Seekabel. Von Dr. Max Roscher. *Map.*

The large map of the world shows both German and other cables.

Historical—Makrizi. **Schwarz.**

Zum Verständnis des Makrīzī. Von Paul Schwarz. Leipzig, etc.: W. Engelmann, 1913. Size 10 × 6½, pp. 10. *Price* 60 *pfg. Presented by the Publisher.*

History of Cartography. *Riv. G. Italiana* **20** (1913): 99–112. **Almagià.**

Intorno a un Cartografo Italiano del secolo XVI. Per R. Almagià.

The map-maker referred to is Mario Cartaro.

History of Geography. **Keltie and Howarth.**

History of geography. By Dr. J. Scott Keltie and O. J. Howarth. London: Watts & Co., 1913. Size 7½ × 5, pp. ix. and 154. *Facsimile maps and Illustrations. Price* 1*s. net. Presented by the Publishers.*

History of Geography. **Oberhummer.**

Hellas als Wiege der wissenschaftlichen Erdkunde. Von Eugen Oberhummer. Vienna, etc.: Carl Fromme, 1913. Size 9½ × 6½, pp. 23. *Price* 60 *Heller. Presented by the Publisher.*

BIOGRAPHY.

Bougainville. *Rev G. Com.* (*S.G. Bordeaux*) (1912): *passim.* **Doublet.**

Le Centenaire du Bougainville. Par E. Doublet. *Illustration.*

Gray. **Gray.**

Reminiscences of India and North Queensland, 1857–1912. By Robert Gray.

London: Constable & Co., 1913. Size 4 × 6, pp. xi. and 271. *Sketch-map and Illustrations. Price 7s. 6d. net. Presented by the Publishers.*

Harris. **Harris.**

From Naval Cadet to Admiral: half a century of naval service and sport in many parts of the world. By Admiral Sir Robert Hastings Harris. London: Cassell & Co., 1913. Size 9½ × 6, pp. xi. and 420. *Portraits and Illustrations. Price 12s. net. Presented by the Publishers.*

Livingstone. **Gregory.**

Livingstone as an explorer. An appreciation. By Prof. J. W. Gregory. Glasgow, 1913. Size 9 × 6, pp. 38. *Sketch-maps.*

Livingstone. *Scottish G. Mag.* **29** (1913): 281–304. **Johnston.**

David Livingstone. A review of his work as explorer and man of science. By Sir Harry Johnston. *Sketch-map.*

See. **Webb.**

Brief biography and popular account of the unparalleled discoveries of T. J. J. See. By W. L. Webb. Lynn, Mass.: T. P. Nichols & Son Co., 1913. Size 9½ × 6½, pp. xii. and 298. *Illustrations. Presented by the Author.*

GENERAL.

Bibliography. **[Whitaker.]**

The reference catalogue of current literature, containing the full titles of books now in print and on sale, with the prices at which they may be obtained of all booksellers, and an index, 1913. 3 vols. London: J. Whitaker & Sons. Size 8½ × 5½, pp. (vol. 1) 1186 [vols. 2 and 3 not paged]. *Price 21s. net.*

British Empire—Text-book. **Bunting and Collen.**

A geography of the British Empire. By W. L. Bunting and H. L. Collen. Cambridge: University Press, 1913. Size 10 × 7½, pp. v. and 159. *Sketch-maps and Illustrations. Price 3s. 6d. Presented by the Publishers.*

Education—Text-book. **Franklin and Griffiths.**

The Atlas geographies: a new visual atlas and geography combined. Part 2: Junior Geography. By Thomas Franklin and E. D. Griffiths. London: W. & A. K. Johnston, 1913. Size 10 × 7½, pp. viii. and 184. *Maps. Price 2s. 8d. net. Presented by the Publishers.*

Education—Text-book. **Hodgkison.**

Preliminary geography. By E. G. Hodgkison. London: W. B. Clive, 1913. Size 7 × 5, pp. xvi. and 225. *Sketch-maps and Diagrams. Price 1s. 6d. Presented by the Publishers.*

Tropical hygiene. **Bostock.**

Health and sickness in the tropics: a guide for travellers and residents in remote districts. By Leonard Bostock. London: Simpkin, Marshall & Co., [1913]. Size 7½ × 5, pp. x. and 94. *Price 2s. net. Presented by the Publishers.*

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

Austria—Bohemia. **Sifton, Praed & Co.**

Sifton, Praed's new map of Bohemia to illustrate the campaign of 1866. Scale 1:750,000 or 1 inch to 11·8 stat. miles. Size 22 by 23 inches. London: Sifton, Praed & Co., Ltd., 1913. *Price 2s. Presented by the Publishers.*

An outline sketch-map, forming one of the publishers' series illustrating important historical epochs. It is somewhat roughly produced, specially as regards the relief; but shows railways, lines of march, and all important places connected with the compaign with which it is concerned.

British Isles—England and Wales. **Ordnance Survey.**

Sheets published by the Director-General of the Ordnance Survey, from October 1 to 31, 1913.

4-mile map.

Large sheet series. Printed in colours, and folded in cover or flat in sheets. Sheets 4, 5, 6. *Price, on paper, 1s. 6d.; mounted on linen, 2s.; mounted in sections, 2s. 6d. each.*

1-inch map.

3rd edition, engraved in outline. Sheet 76. *Price 1s.*

6-inch maps.

Revised. Quarter-sheets, with contours in blue and red. *Price 1s. each.*

Berkshire, 9 S.E., 18 S.E., 36 N.E. **Cheshire,** 30 S.W., 53 N.E., S.E., 59 N.E. **Flintshire,** 10 N.E., S.E. **Lancashire,** 53 S.W., 54 N.W., 54 S.W., 54 S.E. **Sussex,** 1 S.E., 13 S.W., 21 N.W., 72 S.E., 73 N.E. **Yorkshire,** 89 S.E., 90 S.E., 92 S.W., 92 S.E., 93 N.W., 104 S.E., 105 N.W., 105 N.E., 110 N.W., 110 N.E.

1 : 2500 scale.

Revised, with houses stippled, and with areas. *Price 3s. each.*

Devonshire, 117–12, 124–2, 4, 6, 7, 8, 10, 11, 14, 16, 130–2, 3, 4, 5, 6, 7, 8, 10, 11, 12. **Hertfordshire,** 44–15. **Lancashire,** 5–14, 7–5, 9, 12, 13, 14, 10–(4 and 3), 8, 12, 11–1, 3, 5, 6, 9, 16, 12–1, 3, 4, 5, 6, 7, 8, 10, 13, 15, 13–9, 19–8, 20–1, 5, 6, 9, 13, 14, 25–2, 7. Sheets 6–11, 15, 13–1, 5, 13. *Price 1s. 6d. each.* **Middlesex,** 5–15. **Surrey,** 18–12. **Yorkshire,** 39–5, 6, 7, 8, 10, 11, 14, 15, 16, 40–12, 13, 14, 15, 41–9, 14, 53–8, 54–2, 3, 4, 55–1, 2, 4, 7, 56–1, 2, 9, 71–2.

(*Messrs. E. Stanford, Ltd., London Agents.*)

British Isles—London. **Stanford.**

Stanford's new 2-inch map of London and its environs. Scale 1 : 31,680 or 2 inches to 1 stat. mile. Size 26 by 42 inches. London: Edward Stanford, Ltd., 1913. *Price 5s. 6d. Presented by the Publishers.*

A useful general map on one sheet, extending from Highgate on the north to Penge on the south, and from Twickenham on the west to Ilford on the east. The map can be obtained plain for 4s. or printed in colours 5s. 6d. It is entirely new, and care has been taken to give up-to-date information.

Denmark. **Generalstabens Topografiske Afdeling.**

Topografisk Kaart over Kongeriget Danmark udarbejdet og udgivet af Generalstaben. Scale 1 : 40,000 or 1·6 inch to 1 stat. mile. Sheets: Giesegaard; Kallundborg; Reersö; Refsnæs; Ringsted; Sorö; Væslev. Size 15 by 18 inches. Copenhagen: Generalstabens Topografiske Afdeling, 1912–13. *Presented by the Danish Government.*

Denmark. **Generalstabens Topografiske Afdeling.**

Danmark. Scale 1 : 160,000 or 1 inch to 2·5 stat. miles. Sheets 1 to 13, each 15 by 15 inches. Copenhagen: Generalstabens Topografiske Afdeling, 1911–13. *Price 1.24 Kr. each sheet.*

Twelve sheets of a map of Denmark, reduced from the larger-scale surveys. The publication was commenced about two years ago The sheets are more convenient for general reference than those of the older 1 : 40,000 map, which is still in progress, and they have the advantage of being up to date. The map is printed in colours, and the characteristic surface features of the different areas are shown by coloured symbols. Numerous heights are given in figures. The map will be completed in 24 sheets, of which 12 are now published. Each sheet includes about 32 minutes of latitude and 1 degree of longitude.

Hungary. **Kogutowicz.**

Plan of Budapest. [In Hungarian.] By M. Kogutowicz. Scale 1 : 25,000 or 2·5 inches to 1 stat. mile. Size 23 by 33 inches. Budapest: Magyar Földrajzi Intézet, 1913.

A coloured plan, folded for the pocket, with an alphabetical index to places.

Russia. **Loutouguine.**

Carte geologique détaillée du bassin houiller du Donetz. D'après les explorations faites sous la direction de L. Loutouguine. Scale 1 : 42,000 or 1·5 inch to 1 stat. mile. Sheet vii.–27. [With description.] Région anthracifère de Doljansk. Dressée par P. Stepanov. St. Petersburg: Librairie Eggers & Cie., 1912. *Presented by the Comité Géologique, St. Petersburg.*

A continuation of the detailed geological atlas of the basin of the Donetz, which has been previously noticed in the *Geographical Journal.* The sheets of maps and

sections measure 36 by 22 inches, and in one folio all refer to the same area. The maps are on the scale of 1 : 42,000, and on the first the topographical features are shown with contour-lines at vertical intervals of 28 feet (4 sachines). Then follow sheets showing the geology of the district, with numerous geological vertical sections below The present folio deals with the anthracite region of Doljansk, and contains five sheets.

Switzerland. **Frey.**

J. Frey: Berner Oberland und Oberwallis. Scale 1 : 75,000 or 1 inch to 1·2 stat. miles. Size 24 by 34 inches. Bern: Kummerly & Frey, 1913.

A decidedly effective though perhaps somewhat overcoloured map of the Bernese Oberland and Upper Valais, based upon the sheets of the Government Survey. The manner of showing relief bears a general resemblance to that of the combined coloured series of the Siegfried Atlas sheets, except in the shades of the colours selected. Contours, on the ice blue and land brown, are at 30 metres vertical intervals, and the relief is accentuated by side illumination with light from the west, together with colour shading of reddish-browns for the higher lands, toning down to greenish-blue in the valleys. Railways are shown in red, and a considerable amount of other useful information is given.

ASIA.

Asia Minor. **Jerphanion.**

Carte du Bassin Moyen du Yéchil Irmaq. Levée et dessinée par G. de Jerphanion. Scale 1 : 200,000 or 1 inch to 3·15 stat. miles. 4 sheets, each 17 by 24 inches. Paris: Henry Barrère, [1913]. *Presented by the Publishers.*

The area included in this map is the part of Asia Minor lying to the west and north-west of Sivas, and between that place and the Black sea. The map is the outcome of different explorations and surveys made by the author between the years 1904 to 1907, and in 1911. It is based on a rapid triangulation made with a small theodolite, and to points thus fixed the topographical features have been filled in chiefly by prismatic compass and field sketching. The principal heights are from theodolite vertical angles, depending upon the height of the author's house at Tokat (680 metres), obtained from barometric observations. Some parts are more accurately surveyed than others, and M. G. Jerphanion makes this plain, and gives full information about the construction in a leaflet which accompanies his map.

Asia Minor. **Kiepert.**

Karte von Kleinasien bearbeitet von Richard Kiepert. Zweite berichtigte Ausgabe. Scale 1: 400,000 or 1 inch to 6·3 stat. miles. Sheets: A VI. Tirabzon; B VI. Erzerum. Size 18 by 24 inches. Berlin: Dietrich Reimer (Ernst Vohsen), 1913.

These are the second corrected editions of these sheets, with low-lying lands tinted green.

Borneo. **Topographical Bureau, Batavia.**

Schetskaart van de Residentie Zuider-en Oosterafdeeling van Borneo. Scale 1 : 750,000 or 1 inch to 11·8 stat. miles. 4 sheets, each 26 by 24 inches. Batavia: Topographical Bureau, 1913.

Comparatively little survey work has been done in this part of Borneo, and such maps as exist have been compiled from rough route traverses, generally along river-courses. However, this map has been prepared from such material as is available, and it is well executed. Hills are shown by vertical hachures in brown, and water blue. There is an additional sheet showing the administrative divisions.

Singapore. **Stanford.**

Map of Singapore showing the principal residences and places of interest. Scale 1 : 12,672 or 5 inches to 1 stat. mile. Size 23 by 27 inches. Singapore: Fraser & Neave, Ltd., 1913. *Price* 9*s.*

A useful general plan, printed in colours, water blue, roads brown, and buildings shaded by black lines.

AFRICA.

German South-West Africa. **Topographische Abteilung der Landesaufnahme, Berlin.**

Deutsch-Sudwestafrika. Bearbeitet in der Topographischen Abteilung der Landesaufnahme. Berlin, 1910–1912. Vorläufige Ausgabe. Scale 1: 400·000 or 1 inch to 6·3 stat. miles. Sheets: 3, Rehoboth (Amboland); 4, Namutoni; 9, Zessfontein; 10, Franzfontein; 11, Outjo-Tsumeb; 12, Grootfontein; 14, Kap Cross; 15, Swakopmund-Omaruru; 16, Windhuk; 17, Gobabis; 19, Kuiseb-

Unterlauf; 20, Maltahöhe-Rehoboth; 21, Arahoab; 24, Gibeon-Bethanien; 25, Keetmanshoop; 29, Warmbad. Berlin, 1910–12.

Sixteen sheets of an official map of German South-West Africa, prepared from the latest surveys and route traverses, and giving a considerable amount of detailed information. At the bottom of each sheet a full explanation of the symbols employed is given, and from these the character of a road or path, boundaries, springs, waterholes, and other information shown on the map can be readily ascertained. The map is printed in colours—hill shading in brown and water blue—and when complete it will consist altogether of thirty sheets, each measuring 28 by 22 inches.

Natal. **Mines Dept., Natal.**

Geological map of Natal. Prepared by the Mines Department, prior to Union 1910. Scale 1 : 1,267,200 or 1 inch to 20 stat. miles. Published by the Mines Department of the Union of South Africa from information supplied by C. J. Grey, F.G.S., A.R.S.M., when Commissioner of Mines of the Natal Mines Department, and Staff. 1910. Size 15 by 12 inches. Cape Town, 1913. *Presented by the Mines Department of the Union of South Africa.*

Nigeria, Southern. **Guggisberg.**

Africa. Scale 1 : 125,000 or 1 inch to 1·97 stat. miles. Sheets: North B 31–D IV., Ibadan, Southern Nigeria. 1st edit. Published by the authority of Sir Frederick Lugard, G.C.M.G., C.B., D.S.O., Governor, under the direction of Major F. G. Guggisberg, C.M.G., R.E., Director of Surveys, Southern Nigeria, and Captain R. H. Rowe, R.A., Deputy Director, Topographical Branch. Engraved and printed by Messrs. W. & A. K. Johnston, Ltd., Edinburgh and London. Revised to July 20, 1912. *Price* 1*s.* 6*d.* *Presented by Messrs. W. & A. K. Johnston, Ltd.*

New sheet of the Southern Nigeria Survey, the first of which were noticed in the *Geographical Journal* for June, 1908.

AMERICA.

Argentina. **Central Argentine Railway Co.**

Map of the Argentine Railways, 1913. Scale 1 : 1,964,160 or 1 inch to 31 stat. miles. Size 44 by 36 inches. London: The Central Argentine Railway Co.

By means of different colours and symbols the various railways, working and proposed, with their gauges and railway systems, are clearly indicated upon a faintly printed outline map.

Bolivia. **Germann.**

Mapa de la Republica de Bolivia. Por el Injeniero Franz Germann. Scale 1 : 2,000,000 or 1 inch to 31·5 stat. miles. Size 44 by 34 inches. Gotha: Justus Perthes, 1913.

A new edition of a general map of Bolivia that first appeared in 1904. Relief is shown by brown shading and approximate contours at 500 metres, which owing to the lack of reliable material in most parts can only be extremely rough. Indian tribes are shown in red lettering, and the location of minerals by different symbols. An attempt has been made in places to bring the map up to date, and to some extent the surveys of the recent boundary commissions have been made use of; but more might have been done in this matter of revision; for instance, Colonel Fawcett's survey of the river Heath, published in the *Geographical Journal* for April, 1911, seems to have been entirely ignored.

Canada. **Dept. of the Interior, Ottawa.**

Sectional Map of Canada. Scale 1 : 190,080 or 1 inch to 3 stat. miles. Sheets: 121, Riding Mountain, Manitoba, revised to May 12, 1913; 170, Yorkton, Saskatchewan, revised to May 15, 1913; 270, Pasquia, Saskatchewan, revised to April 17, 1913; 413, Iosegun, Alberta, revised to June 6, 1913; 461, Moberly, British Columbia, revised to June 6, 1913; St. John, British Columbia, revised to May 26, 1913; 512, Montagneuse, Alberta, revised to April 21, 1913. Each 16 by 28 inches. Ottawa: Department of the Interior, Topographical Surveys Branch, 1913. *Presented by the Department of the Interior, Ottawa.*

Canada: **Dept. of the Interior, Ottawa.**

Map of Manitoba, Saskatchewan, and Alberta, showing the number of quarter-sections available for Homestead entry in each township, also the pre-emption and purchased homestead area as defined by the Dominion Lands Act, 1908. Corrected to May 1, 1913. Prepared in the Railway Lands Branch under the direction of F. C. C. Lynch, Superintendent. Scale 1 : 2,217,600 or 1 inch to 35 stat. miles. Size 21 by 32 inches. Ottawa: Department of the Interior, 1913. *Presented by*

F. C. C. Lynch, Esq., Superintendent, Railway Lands Branch, Dept. of the Interior, Ottawa.

Shows the number of quarter-sections available for homestead entry in each township, the boundaries of agencies, the office of agencies, the boundary of pre-emption and purchased homestead tract to which provision of the Dominion Lands Act respecting purchased homesteads apply; land within the pre-emption tract to which provisions regarding pre-emptions do not apply, forest reserves, Indian reserves, and townships which have not been surveyed.

Canada. **Dept. of the Interior, Ottawa.**

Standard Topographical Map of Canada. Scale 1 : 500,000 or 1 inch to 7·89 stat. miles. Sheet: 12 and 35 (part of), Montmagny, Quebec. Size 32 by 20 inches. Ottawa: Department of the Interior, 1913. *Presented by the Department of the Interior, Ottawa.*

A coloured map showing county and other divisions. Rivers, roads, and railways are given, but no attempt has been made to represent relief.

Canada. **Geological Survey of Canada.**

Geological Survey. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Map 53 A, South-east Nova Scotia. Size 18 by 45 inches. Ottawa: Department of Mines, Geological Survey, 1911. *Presented by the Department of Mines, Geological Survey of Canada.*

Colombia. **Kunst.**

Eine neue Karte des Alto Chocó (Kolumbien, Südamerika) und desen Grundlagen von Dr. Joh. Kunst. Scale 1 : 810,000 or 1 inch to 12·8 stat. miles. Size 27 by 14 inches. Hamburg: L. Friederichsen & Co., 1913. *Price 4 M. Presented by the Publishers.*

The interior part of this map has been prepared from the author's surveys and astronomical observations, combined with the maps and surveys of previous geographers and travellers, while the coast-line is taken from the latest charts. The area included is from 4° to 7° N. lat. and 76° to 78° 30′ W. long., and embraces the valley of the Rio Atrato. In a pamphlet which accompanies the map Dr. Kunst gives a very complete account of its construction, with lists of the positions upon which it is based and a description of the country. The map is important, especially as so little reliable cartographical material exists of this part of South America. The style in which it is produced is decidedly rough, and hardly does justice to the work the author has done.

United States. **Rand, McNally & Co.**

Rand, McNally & Co.'s Commercial Atlas of America. 1913 edition. Size 21 by 16 inches. Chicago: Rand, McNally & Co., 1913.

A new edition of a well-known atlas containing altogether 87 maps and diagrams. These include large-scale maps of all the states of the United States, maps of the countries adjacent, general maps of the continents and other parts of the world. From a cartographical point of view the maps are unsatisfactory productions, but the atlas will be useful for reference, especially the maps of the States, since detailed and up-to-date information is given as regards railways and other matters in a compact and convenient form. Each map has on the back a good index to places, with populations, etc., and there are other statistical tables that should be useful. The atlas is essentially commercial in character, and will be found of service to all who have business relations with the United States.

United States. **U.S. Dept. of Agriculture.**

National Forests with transportation routes and supervisors' headquarters. Issued by the Office of Geography. Scale 1 : 2,000,000 or 1 inch to 94·7 stat. miles. Size 20 by 31 inches. Washington: U.S. Department of Agriculture, Forest Service, 1911. *Presented by the U.S. Department of Agriculture.*

Sketch-map with forests, district boundaries and numbers, outline and lettering in green. Railways, stage lines, water routes, supervisors' headquarters, and other information are shown in red.

United States—California. **General Land Office, Washington.**

State of California. Compiled from the Official Records of the General Land Office and other sources under the direction of J. P. Berthrong, chief of Drafting Division, G.L.O., 1913. Scale 1 : 760,320 or 1 inch to 12 stat. miles. 2 sheets, each measuring 29 by 47 inches. Washington: Department of the Interior, General Land Office, 1913.

AUSTRALASIA.

Tasmania. **Surveyor-General, Hobart.**

Sketch-map of the general geological features of Tasmania. Scale 1 : 950,400 or 1 inch to 15 stat. miles. Size 19 by 15 inches. Hobart: Surveyor-General's Office, 1913. *Presented by the Lands and Survey Department, Tasmania.*

GENERAL.

World. **Haack and Von Seydlitz.**

Haack-Von Seydlitz: Oberstufen-Atlas für höhere Lehranstalten. 160 Haupt- und 291 Nebenkarten auf 56 Tafeln mit einem Sach- und Namenverzeichnis. (*Price* 6 *M.*)—Unterstufen-Atlas für höhere Lehranstalten. 68 Karten und Darstellungen auf 24 Tafeln. (*Price* 2.40 *M.*) In engem Anschluss an die E. von Seydlitz Geographie unter schulmännischer Mitarbeit ihrer Herausgeber bearbeitet von Dr. Hermann Haack. Gotha: Justus Perthes, 1913.

These are two new atlases, one for the upper forms and the other for the lower forms, of higher educational establishments. Each measures 11½ by 8¼ inches, and the former contains 160 principal maps and 291 smaller maps and insets upon 56 sheets, with a good index to subjects and place-names; while in the latter there are 68 maps and diagrams on 24 sheets. The larger atlas gives, after the indices, a sheet showing different cartographical methods of representing topographical features, maps illustrative of the geology and physical geography of Central Europe and Germany, maps of the German Empire, and of other parts of the world outside Europe, including the continents. Altogether these maps contain a large amount of information in a small compass, so much indeed that in some instances it tends to confusion and overcrowding, especially on some of the numerous small maps and insets on one sheet. The general maps are orographically coloured, in red, brown and green, and as a rule are effective, though occasionally the colouring is too dense and renders it difficult to read names and detail.

World. **Monaco.**

Carte générale bathymetrique des Océans. Publiée par le Cabinet Scientifique de S. A. S. le Prince de Monaco. Scale 1 : 10,000,000 or 1 inch to 157·8 stat. miles. Sheets A'I. and A'II. each 23 by 39 inches. Paris, 1913. *Presented by the Cabinet Scientifique de S. A. S. le Prince de Monaco.*

These are two sheets of the new edition of this important map. A'I contains the greater part of the South Atlantic ocean from the equator to lat. 47° S., the whole of South America included between these latitudes, with the adjacent Pacific ocean as far as the Galapagos islands, while sheet A'II. joins A'I. to the west, and shows the Pacific ocean between the same latitudes as far as the Fiji islands. A comparison with the earlier edition will show that considerable alterations have been made in the tints indicating depths in blue, which have been revised from the soundings of the latest surveying vessels, a list of which is given at the bottom of the sheets. A great improvement is the orographical colouring, in shades of brown, which have been added to the land. The map will be completed in twenty-four sheets, four of which are now published.

World. **Wagner.**

Sydow-Wagners Methodischer Schul-Atlas. Entworfen, bearbeitet und herausgegeben von Hermann Wagner. 63 Haupt- und 51 Nebenkarten auf 47 Tafeln. Fünfzehnte, berichtigte und ergänzte Auflage. Gotha: Justus Perthes, 1913.

The fifteenth edition of a deservedly well-known school atlas which first appeared in 1888, and which has now been carefully revised and brought up to date. The atlas measures 12½ by 8 inches. Arrangements have been made so that in the future the atlas can be obtained in two forms, either with or without a reference index to places.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, from September 28 to November 1, 1913. *Presented by the Hydrographer, Admiralty.*

New Charts—No. 874, Japan, Korea strait—Plans, in Tsu sima: Shishimi ko, Sasuna ko, Izumi ura and Nishitomari wan, Izuhara ko and Azu ko, 3*s.* **New Editions**—No. 2058, Atlantic ocean: North Atlantic route chart (Eastbound and Westbound routes are shown printed in different colours), 5*s.* 2483, Atlantic and Indian oceans, with the western portion of Pacific ocean, 5*s.* 782, Pacific ocean comprised between the parallels of 37° north and 37° south, and extending from the Philippine and Celebes islands, New Guinea and Australia, to

San Francisco and Easter island: north-east sheet, 3*s*. 1598, England, south coast: English channel, 6*s*. 1170*b*, England, west coast: Great Ormes head to Liverpool, 3*s*. 1607, England, east coast: River Thames entrance, North Foreland to the Nore, 5*s*. 2151, England, east coast: River Thames, Broadness to Mucking light, including Gravesend and Lower Hope reaches, 4*s*. 1694, England, east coast: Outer Gabbard to Outer Dowsing, 4*s*. 1543, England, east coast: Yarmouth and Lowestoft roads (Plans: Yarmouth haven, Lowestoft harbour), 4*s*. 1150, England, east coast: River Thames, Erith to Broadness, 3*s*. 2182*a*, North sea: the North sea, southern sheet, 4*s*. 1106, France, north coast: Cape Flamanville to St. Marcouf islands, 3*s*. 2608, Mediterranean, France: Approaches to Toulon, 3*s*. 190, Mediterranean: Ports on the coast of Sicily: Girgenti, Catania, 2*s*. 1818, Azores: Terceira and Graciosa (Plans: the Caldeira of Graciosa, Gomez bay, Praya de Graciosa, Praya de Terceira, Cabras islands, Angra de Terceira), 2*s*. 604, Africa, west coast: Cape Lopez bay to St. Paul de Loanda (Plans: Mayumba bay, Malemba bay, Kabenda bay, Vesuvius shoal and dangers off Margate head, Ambrizette bay, Port Ambriz, St. Paul de Loanda harbour). Plans of anchorage at Alongubuna point, Fernand Vaz entrance, and Cape Lopez bay and entrance of Ogowé river, on this sheet erased. Plans added: Mandji anchorage, Lendana bay, entrance to river Congo, 3*s*. 1012, Indian ocean: Arabian sea, 4*s*. 40, India, west coast: Karachi (Kurrachee) harbour, 3*s*. 50, India, west coast: Diu head to Goapnáth point (Plans: Salbet, Mahuva (Mowah) bandar, Mandwa bay). Plan added: Diu harbour, 4*s*. 2661*a*, China sea: China sea, northern portion, western sheet, 3*s*. 1754, China, east coast: Tung yung to Wen chau bay. Plan added: Nam kwan harbour, 3*s*. 1288, China: Plans in the Yang tse kiang: Se yun kau creek to Silver island, Ckin kiang fu and Silver island, 3*s*. 511, Russian Tartary: Trinity bay to the Eastern Bosporus, including Amur bay, 3*s*. 83, Japan, Inland sea: Gogo shima to Miyo shima, including Kurushima kaikyo. (Plan: Mitsugahama road). 3*s*. 2415, Japan, Kiusiu: approach to Nagasaki harbour, 3*s*. 2815, Japan, Kiusiu: Nakasaki harbour (Plan: Approach to Mitsubishi dockyard), 2*s*. 2764, Australia, east coast: Coral sea and Great Barrier reefs, showing the Inner and Outer routes to Torres strait, Sheet 2, 3*s*. 2766, New Guinea: North-east coast of New Guinea, with Bougainville, New Britain, New Ireland, Admiralty islands, and off-lying reefs. Plan added: Luther anchorage, 3*s*. 3030, Pacific ocean: New Hebrides islands and New Caledonia, 3*s*. 1282, Chile: Lora point to Maitencillo (Plan: Quintai road, Oscuro cove, Rapel river, Matanza anchorage, Ports San Antonio and San Antonio de las Bodegas, Tuman bay, Topocalma roads, Port Zapallar), 2*s*. 2004, Uruguay: Colonia roads, 2*s*. 1452, West Indies, Bahamas: Nassau harbour, 3*s*. 2013, New Brunswick: West Quoddy head to Point Lepreau, 2*s*. 1942, Prince Edward island: Bedeque harbour, 2*s*. 2751, Arctic sea: Spitsbergen (Plan: Jan Mayen island), 3*s*.
(*J. D. Potter, Agent.*)

Atlantic, North, and Mediterranean. **Meteorological Office.**

Monthly Meteorological charts of the North Atlantic and Mediterranean, November, 1913. London: Meteorological Office, 1913. *Price 6d. each. Presented by the Meteorological Office.*

Atlantic, North. **U.S. Hydrographic Office.**

Pilot chart of the North Atlantic Ocean, October, 1913. Washington: U.S. Hydrographic Office, 1913. *Presented by the U.S. Hydrographic Office.*

French Equatorial Africa. **Mission Hydrographique du Gabon.**

Côte Ouest d'Afrique. Estuaire du Gabon, Mouillage de la Pte. Owendo, plan levé en 1912, Echelle 1: 5000 (12·6 inches to 1 stat. mile): Baie du Cap Lopez, Mouillage de Manji et embouchure de l'Ogooué, plan levé en 1911, echelle 1: 30,000 (2·1 inches to 1 stat. mile); Bas-Ogooué, croquis effectués au 20 Septembre au 3 Octobre, 1911, echelle 1: 50,000 (1·3 inch to 1 stat. mile); Lagunes N'Dogo, Simba et Sunga, echelle 1: 100,000 (1 inch to 1·6 stat. mile), par ordre de M. Martial Merlin, Gouverneur-Général de l'Afrique Equatoriale Française, sous la direction du Lieutenant de Vaisseau Audoin, Chef de la Mission hydrographique du Gabon. Paris: Ministère des Colonies, [1913]. *Presented by M. le Gouverneur-Général de l'Afrique Equatoriale Française.*

Indian Ocean. **Meteorological Office.**

Monthly meteorological charts of the Indian Ocean, November, 1913. London: Meteorological Office, 1913. *Price 6d. each. Presented by the Meteorological Office.*

PHOTOGRAPHS.

Basutoland. **Wilson.**

Photograph of Kaffir girls, showing dress worn on entering womanhood, taken near Maseru, Basutoland, by T. Wilson, Esq., J.P. *Presented by T. Wilson, Esq., J.P.*

Central Asia. **Read.**

Eighty-three photographs taken during a journey from Kashmir over the Pamirs and Tian Shan mountains to Omsk, by W. R. Read, Esq., King's Dragoon Guards, 1912. *Presented by W. R. Read, Esq.*

Although most of the route followed was by no means new, these photographs are interesting. They measure 4 by 5 inches, and many of them are decidedly good and clear.

(1) From the Dal Darwasa looking up towards the Dal lake; (2) A dunga floating down the Jhelum river; (3) The fort at Astor; (4) A party descending north side of the Burzil pass; (5) On the Burzil pass; (6) Snow buttresses of Mount Rakapushi; (7) Mount Rakapushi from Nilt; (8) From the Batur glacier looking up the Kanjut valley; (9) The Batur glacier near Hunza; (10) View of the Batur glacier; (11) Types of Hunza coolies; (12) The Mir of Hunza and his little son; (13) The Mir of Hunza's palace; (14) A rock gorge in the Kanjut valley; (15) In the Kanjut valley—a piece of the road; (16) Types of Kirghiz inhabitants of the Pamirs; (17) Kirghiz girls and boy on the Pamirs; (18) A Kirghiz woman in full dress; (19) Loading up yaks; (20) In the distance the summit of the Chichiklik pass between Tashkurgan and Tarbashi; (21) The market-place, Kashgar; (22) Chinese Arabas outspanned at a serai between Kashgar and Aksu; (23) Arabas used by author between Kashgar and Aksu; (24) A street in Yangi Shahar; (25) The Dotai of Aksu; (26) Part of Aksu; (27) Some Indian traders in Aksu; (28) Aksu; (29) Mohammedan graveyard, Aksu; (30) Mohammedan graves in Aksu; (31) Jom; (32) Washing clothes at Jom; (33) Chinese fort built across the entrance to the Tian Shan mountains; (34) Nearing the Tian Shan mountains; (35) Fording the Muzart river; (36) An accident during the fording of the Muzart river; (37) The Muzart glacier; (38) Transport crossing summit of Muzart pass; (39) A glacier coming down from a side nullah into the northern slopes of the Muzart; (40) View looking east from a point halfway down north side of Muzart pass; (41) Country in the Tekes valley; (42) The Tian Shan mountains near the source of the Tekes river; (43) Tekes valley; (44) Tekes valley between the Muzart pass and Kulja; (45) Types of Kazaks in the Tekes valley; (46) Mode of transport favoured by the Kazaks of the Tekes valley; (47) The Tekes country; (48) Trekking in the Tekes country; (49) Snow leopard shot in the Tian Shan; (50) *Ovis Karelini* shot in the Tian Shan; (51) Camp in Bhika nullah, Tian Shan; (52) Helping a baggage pony down a bad place in the Agiass valley, Tian Shan; (53) A Kalmuk shikari of the Tian Shan; (54) An ibex camp in the Agiass valley; (55) *Ovis ammon* shot in Tian Shan; (56) Gorge through which the Kok Su flows near its junction with the Tekes river; (57) The headwaters of the Kok Su; (58) The Jirgalan valley; (59) Camp in the Tian Shan; (60) Wapiti ground in the Burra Jirgalen valley; (61) Wapiti shot in Tian Shan; (62 and 66) Wapiti camp in the Tian Shan; (63) Typical Wapiti ground; (64) Wapiti shot in Tian Shan mountains; (65) Antlers of wapiti shot in Tian Shan; (67) Striking wapiti camp; (68) Mode of threshing in the Ili valley, near Kulja; (69) Illik or Siberian roe deer, shot in Tian Shan mountains; (70) Kazaks and Aül near Kulja; (71) Kazak married and unmarried women with Kazak boy near Kulja; (72) Country near the southern shores of the Ebi Nor, Dzungaria; (73) Trekking along the west shore of the Ebi Nor; (74) Types of Nomad Kazaks; (75) Mongolian women near Chuguchak, West Dzungaria; (76) Wall of Chinese fort in Chuguchak; (77) Street in Chuguchak; (78) Main thoroughfare of Chuguchak; (79) Sleigh in Siberia; (80) Siberian village in winter near Semipalatinsk; (81) Cathedral in Semipalatinsk; (82) Posting by sleigh between Semipalatinsk and Omsk; (83) Mode of transport in Siberia.

China. **Pereira.**

Fifty photographs of the Ordos country, China, taken by Colonel George Pereira, C.M.G., D.S.O. *Presented by Colonel George Pereira*, C.M.G., D.S.O.

The Ordos country is so imperfectly known that these photographs are of special interest. An account of the journey during which they were taken appeared in the *Geographical Journal* for March, 1911.

(1) Inn yard, Ta-ho, north-west of Kalgan; (2) Peking cart from Kalgar; (3) Colonel Pereira's Chinese boy, cart, and cook; (4) Pony dragging heavy cart; (5) Cave dwellings in loess, Kuei-hua-ch'eng; (6) Policeman with twelve strings from bark, Kuei-hua-ch'eng; (7) Carts at inn Pi-hsieh-ch'i, west of Kuei-hua-ch'eng; (8) Boats on Yellow river; (9) My cart on Yellow river ferry; (10) My tent and boys, first camp, Mo-pa-la; (11) No-bo, Mongol pile of stones, Ma-ra-jay hill; (12) Shara-mori well; (13)

Huang-ch'u-ch'iao market north of Ning-hsia Fu; (14) High farm carts, Kansu; (15) Han-ch'u canal, south of Ning-hsia Fu; (16) Hui-lung canal; (17) Hui-lung canal, typical bridge; (18) Han-ch'u canal, Hsi'ao-pa; (19) Drum tower, Chung-wei Hsien; (20) The Great Wall at I-ti'ao-shan; (21) Cutting poppies for opium juice; (22) Lan-chou Fu; (23) Waterwheel on Yellow river; (24) Covered camel-backed bridge west of Lan-chou Fu; (25) Yellow river ferry, Hsin-Ch'eng; (26) Raft of pigskins; (27) Wood bridge over Tai-t'ung river near Hsian-T'ang; (28) Rock temple, Pei-ma-ssu; (29) Bridge over Hsi-ning river at Hsiao-hsia Kou; (30) Tibetan with yak south of Dan-gar; (31) Boys and escort on Obo, summit of Ta e-po-shan; (32) Tibetan outside his tent; (33) Tibetan man and women holding in dogs; (34) Officials in village of Shara-k'u-t'ou; (35) Columns of mud to mark 5 li distance, south of Dan-gar; (36) Living Buddha and lamas riding; (37) Pai-lou (arch) in Dan-gar: (38) Carrying drunkard, Dan-gar; (39) Chinese-Tibetan woman (chia-fan); (40) Small temple in defile east of Dan-gar; (41) Famous Kum-bun tree with Tibetan inscriptions; (42) Kum-bun, court-yard of monks' dwelling; (43) Kum-bun, entrance to monastery; (44) General view of Kum-bun; (45) Mongols on road; (46) Loess ravine, east of Hsi-ning Fu; (47) Mules on bad road to Lao-ya-ch'eng; (48 and 49) Great Wall east of Lan-chou Fu; (50 and 51) Temple 8 miles east of Lan-chou Fu; (52) Main east and west street of Lan-chou Fu.

East Africa Protectorate. **Blackburne-Maze.**

Nine photographs of Mount Kenya, East Africa Protectorate, taken by Cecil I. Blackburne-Maze, Esq. *Presented by Cecil I. Blackburne-Maze, Esq.*

Mount Kenya is so often obscured by mists that good photographs of the summit cannot be taken as often as might be supposed. These, which were taken from the slopes of the mountain, measure 4½ by 3¼ inches, and are a useful addition to the Society's collection. No. 1 is an exceptionally clear view of the mountain.

(1) Mount Kenya; (2) The peak of Kenya in a mist; (3) Top of glacier about 16,000 feet: (4) View from our camp, about 14,000 feet; (5) One of the glaciers; (6) Vegetation about 14,000 feet; (7 and 8) Looking across the glacier; (9) Looking into a crevasse.

South Africa. **Reddie.**

Thirty-four photographs of Namaqualand, South Africa, taken by Captain R. A. Reddie. *Presented by Captain R. A. Reddie.*

A set of photographs taken some years ago by Captain Reddie when he was engaged on a reconnaissance survey. They are 5¾ by 3¼ inches in size, and give a good idea of the kind of country to be traversed, and the manner of travelling. The titles are as follows:—

(1) Jetty, Port Nolloth; (2) Ancient carriages, Port Nolloth-O'okiep railway; (3) O'okiep from north-east; (4) Looking north-west from O'okiep; (5) "Windsor Castle," O'okiep; (6) Native huts, O'okiep; (7) Frightened of the camera; (8) Jacky, our tame jackal; (9) Our hawk; (10 and 11) Finches' nests; (12) Threshing the corn; (13) A local store; (14) Ox-waggon; (15) Spanning in the oxen; (16) Our Cape cart; (17 and 18) Date palms, Kookfontein; (19) Kookfontein; (20) Young oryx; (21) Yellow cobra; (22) Camp on and near mouth of Spoeg river; (23-26) Refugee Hottentots from German South-West Africa; (27) Raman's drift, Orange river; (28) Orange river east of Raman's drift; (29) Hottentot leaders against Germans in Herraro war; (30) German sentry, Raman's drift; (31) Pont at Raman's drift, Orange river; (32 and 33) Typical scenery, Namaqualand; (34) R.C. Mission at Pella.

Tibet. **White.**

Panorama of Lhasa made by the autotype process from negatives taken by J. C. White, Esq., C.I.E. *Presented by T. J. Hoffmann, Esq.*

A good panoramic view of Lhasa and the surrounding country, measuring 45 by 10½ inches, taken during the visit of the 1904 expedition.

Turkey in Asia. **Stanley.**

Photograph of the Melek Taous or King Peacock of the Yezidis, taken by Dr. G. W. Stanley. *Presented by Henry C. Hony, Esq.*

An interesting photograph showing the peacock, an image in brass 18 inches high, and an image representing the sun at the side, and old bronze pots for collecting money paid by those coming to worship the peacock. Mr. Hony, who presents the photograph, has written an interesting description to accompany it.

N.B.—It would greatly add to the value of the collection of Photographs which have been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

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